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THE UNIVERSITY OF ALBERTA

STRATIGRAPHY AND SEDIMENTOLOGY OF THE ORDOVICIAN AND SILURIAN
BRODEUR GROUP, NORTHERN BRODEUR PENINSULA, BAFFIN ISLAND

by



FRANZ WERNER NENTWICH

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF GEOLOGY

EDMONTON, ALBERTA

FALL 1987

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ISBN 0-315-41047-7

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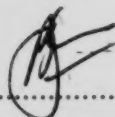
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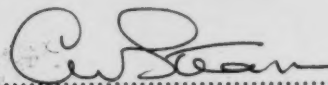
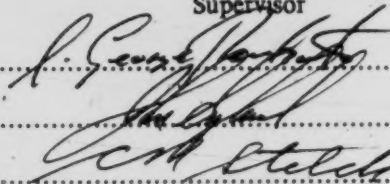
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled STRATIGRAPHY AND SEDIMENTOLOGY OF THE ORDOVICIAN AND SILURIAN BRODEUR GROUP, NORTHERN BRODEUR PENINSULA, BAFFIN ISLAND submitted by FRANZ WERNER NENTWICH in partial fulfilment of the requirements for the degree of DOCTOR OF PHILOSOPHY in GEOLOGY.



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DEDICATION

This thesis is dedicated to those striving to break free of circular arguments and irrelevant negative evidence. The 'spinoffs' can lead in new directions, sometimes even the right ones. It is also dedicated to those who believe that too much data is better than too little, although it must be admitted that some can make more of the same factual information than others. For example, Jameson (*in* Parry, 1826, p. 147) remarked in reference to the geology of the Somerset Island-Brodeur Peninsula area that

From the data before us, it is not easy to refer all the limestones of Prince Regent's Inlet to their places in the geognostical series. The limestone associated with gypsum in North Somerset may safely be referred to the second limestone formation, the first or floetz limestone of Werner. The lower limestones of North Somerset, and those of Port Bowen, Neill's Harbour, and of most of the country on the east side of Prince Regent's Inlet, may either form part of the secondary limestone, - a supposition countenanced by the universal horizontality of its strata, its magnesian character, its brown hematite, and certain organic remains it contains; or it may belong to the first secondary limestone, - a conjecture not destitute of plausibility, when we recollect its imbedded chert, and the characters of some of its fossil remains.

Although Jameson did not accompany the expedition his ideas record the first formulation of the stratigraphic problems that have been the source of so much confusion in the area. It is all the more remarkable that these ideas were recorded five years before Charles Darwin set sail in the Beagle and thirteen years before Charles Dickens published his now classic *Nicholas Nickleby*.

ABSTRACT

The Ordovician-Silurian Brodeur Group of northwestern Brodeur Peninsula comprises the Baillarge and Cape Crauford formations, a succession of shallow shelf carbonates deposited hundreds of kilometres southeast of the Franklinian Geosyncline. The Baillarge Formation is divided into two members. Member A (140 m) at the base comprises variously dolomitic interstratified carbonates and subsidiary carbonate solution breccia. Member B (374 m), of Late Ordovician to Early Silurian age, comprises mottled dolomitic limestone and rare carbonate solution breccia. A major unconformity in which Middle Ordovician strata are missing separates the two members. The overlying Early Silurian (Llandoveryan) Cape Crauford Formation is divided by a regional unconformity (representing a buried karst surface) into upper and lower members. The lower member varies in thickness from 130 m in the southwest near the axis of the Melville High to 208 m in the northeast. It comprises acyclic but shallowing-up variously dolomitic interstratified carbonates and carbonate solution breccia. During subaerial exposure at the top of the lower member diagenesis included dolomitization, calcification, stylolitization, silicification, leaching, brecciation and formation of diagenetic coated grains and clasts. Caves, formed by carbonate dissolution, collapsed to produce both concordant and discordant breccias. This differs from earlier views based on evaporite dissolution as the mechanism of brecciation. The concordant breccias are tabular, laterally continuous for several kilometres and occur preferentially in light coloured carbonates, especially limestone. Most of the discordant breccias are 'inverted-cone-shaped' pipes many of which, but not all, extend down to meet concordant breccias. Where dissolution was most extreme, collapse structures, including grabens (paleodolines) were formed. The upper member of the Cape Crauford Formation is divided into unit A (110 m) and an overlying unit B (42 m). Unit A is a fossiliferous pervasively dolomitized succession and unit B is similar to the lower member of the Cape Crauford Formation. More than one episode of karsting is recorded by solution breccias in the upper member and by rare collapses of the upper into the lower member.

ACKNOWLEDGEMENTS

I gratefully acknowledge the following individuals and organizations without the help of which, financial and otherwise, this study would not have been possible. The Polar Continental Shelf Project, (G. Hobson, Director) of the Department of Energy, Mines and Resources provided logistical aid over three field seasons. The pilots of Bradley Air Services and Quasar Helicopters are thanked for their considerable help during camp moves. Financial support was obtained from the Department of Indian Affairs and Northern Development (Contracts YK83-84/078 and YK84-85013 to Jones) and grants from the Boreal Institute for Northern Studies (1982-87). Additional funding was provided by an American Association of Petroleum Geologists research grant and a grant from the Natural Sciences and Engineering Research Council (Grant No. A6090 to Jones). The writer is also grateful for Teaching Assistantships in the Department of Geology, an Inter-session Bursary and a Province of Alberta Fellowship all of which partly offset personal expenses during my stay at the University of Alberta. The Oil and Minerals Division of the Department of Indian and Northern Affairs provided unpublished oil and gas geological and geophysical reports for Brodeur Peninsula and the surrounding area which proved to be of considerable value. The Government of the Northwest Territories granted collecting licenses and Panarctic Oils Ltd. made available the Garnier O-21 borehole cuttings samples. Assistance in the field was ably provided by D. Park, A. Buscas, and R. MacIntosh.

I am grateful to Drs. H. Trettin of the Geological Survey of Canada and W. Gibbins of the Department of Indian Affairs and Northern Development for discussions on the geology of Brodeur Peninsula. Conodonts were identified by Drs. Godfrey Nowlan and B. Chatterton. Special appreciation is expressed to my thesis supervisor, Dr. Brian Jones, who was instrumental in planning my program at the University of Alberta and was always available for consultation. I am also grateful for the help provided by Leni Honsaker with printing the final copies of plates. Finally, thanks go to my thesis committee, consisting of

Drs. C. Stelck, B. Jones, G. Pemberton, C. Stern and J. England. Their constructive criticisms were greatly appreciated.

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I. INTRODUCTION

A. GEOGRAPHIC SETTING AND PHYSIOGRAPHY

Brodeur Peninsula is bounded on the north by Lancaster Sound, on the west by Prince Regent Inlet and on the east by Admiralty Inlet (Fig. 1.1). The study is confined to the area north of 73° where Brodeur Peninsula is a plateau lying between 150 and 300 m asl. The cartographer J. Lavoie, who crossed Brodeur Peninsula from Admiralty Inlet to Port Bowen described it as "...an immense wind-swept table-land, a barren desert without any sign of vegetation." (*in* Bernier, 1912, p. 92). Some areas in the northern and eastern part of the peninsula, however are above 450 m (Fig. 1.2) with maximum elevations of 580 m near Sargent Point. In a general way the regional northwest dip of the bedrock is reflected by a northwest-sloping land surface (compare Figs. 1.2 and 3).

Numerous streams and rivers transect the surface forming a trellis drainage pattern. Lakes, though numerous, do not exceed 3 km in size. Several icefields and glaciers are present along the east and north coast (Fig. 1.3) and most of the plateau is covered by Quaternary deposits which were considered by Craig (1965) for the southern part of the peninsula. The best bedrock exposures occur in coastal cliffs though some are present along river valleys in the interior.

B. OBJECTIVES OF STUDY

The main objective was to determine the origin and nature of brecciation in the Brodeur Group, northern Brodeur Peninsula. It was suggested in earlier studies that the breccias of Brodeur Peninsula were formed by dissolution of evaporites similar to those now exposed on northeastern Somerset Island. Regional stratigraphic correlation with southern Devon and Somerset islands was therefore one of the prime objectives of this study. These objectives may be broken down as follows:

1. Review all pertinent geological and geophysical data available for northern Brodeur Peninsula to avoid duplication of previous work and provide a starting point for the

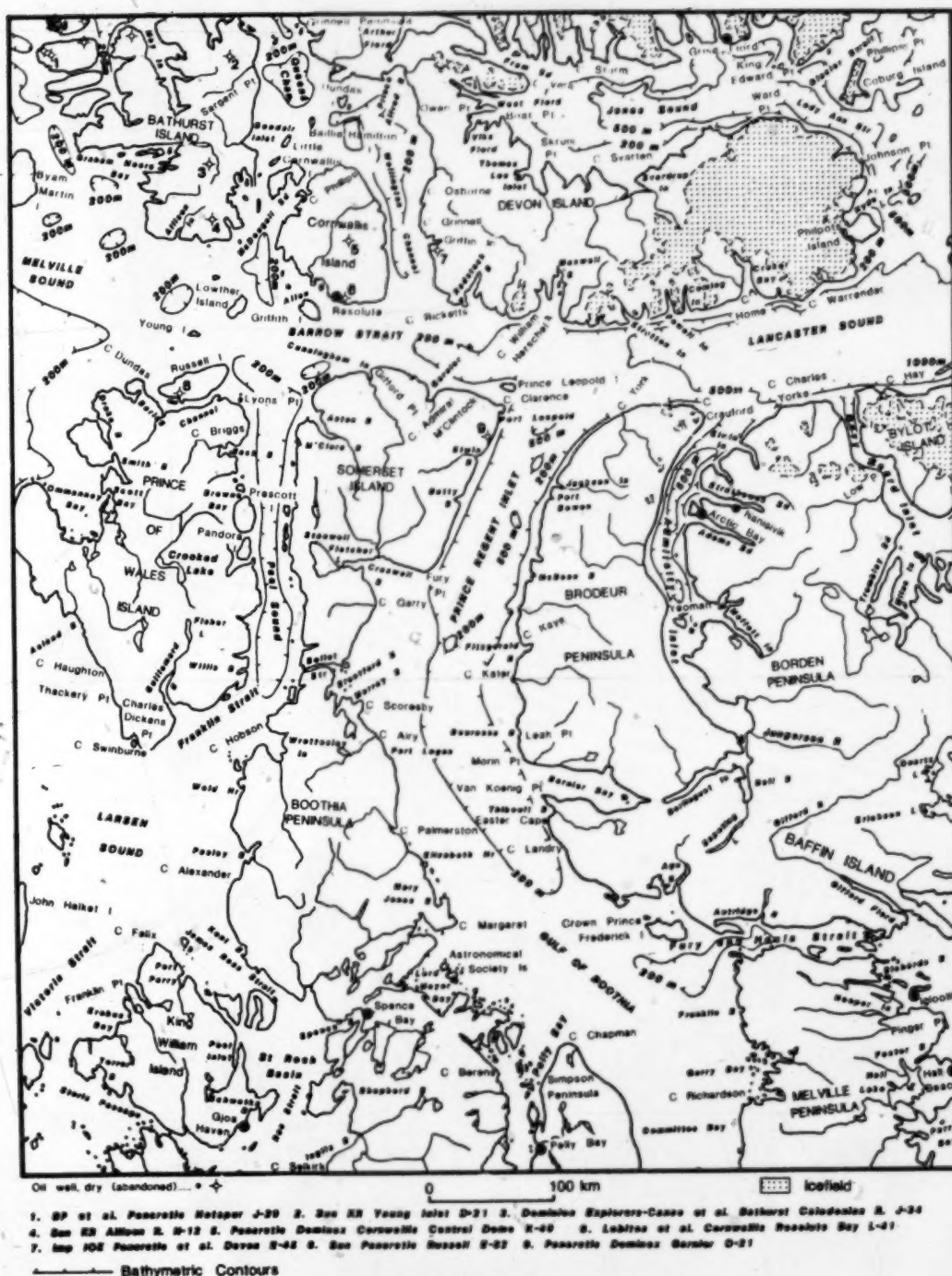


Figure 1.1 Boreholes, bathymetry and place names, south-central Canadian Arctic Archipelago. Simplified and modified from map of the Northwest Territories and Yukon Territory (1:4,000,000 scale), Department of Energy, Mines and Resources, Ottawa.

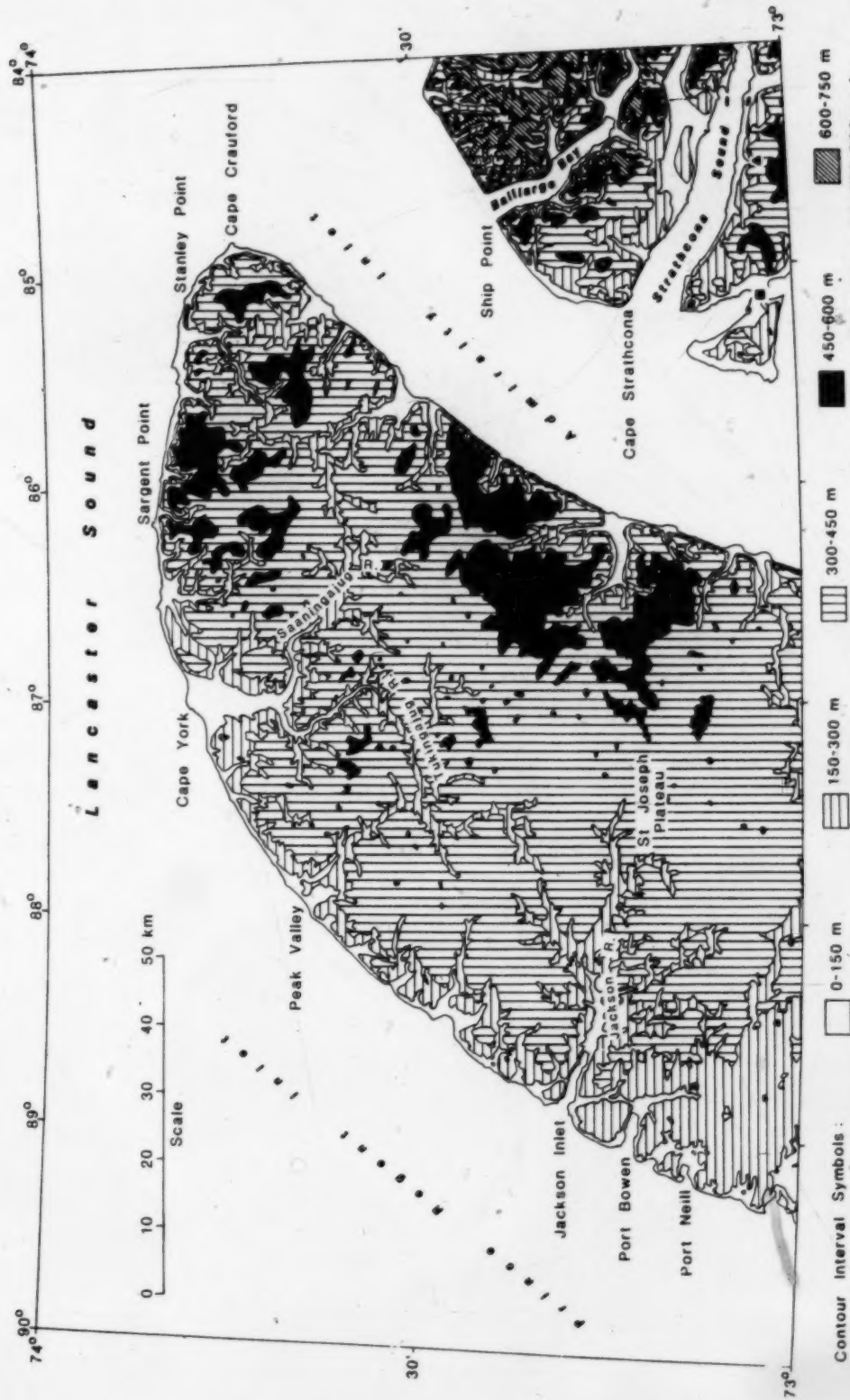


Figure 1.2 Topography and main geographic features of northern Brodeur Peninsula. Simplified and modified from 1:500,000 scale topographic maps, Department of Energy, Mines and Resources, Canada.

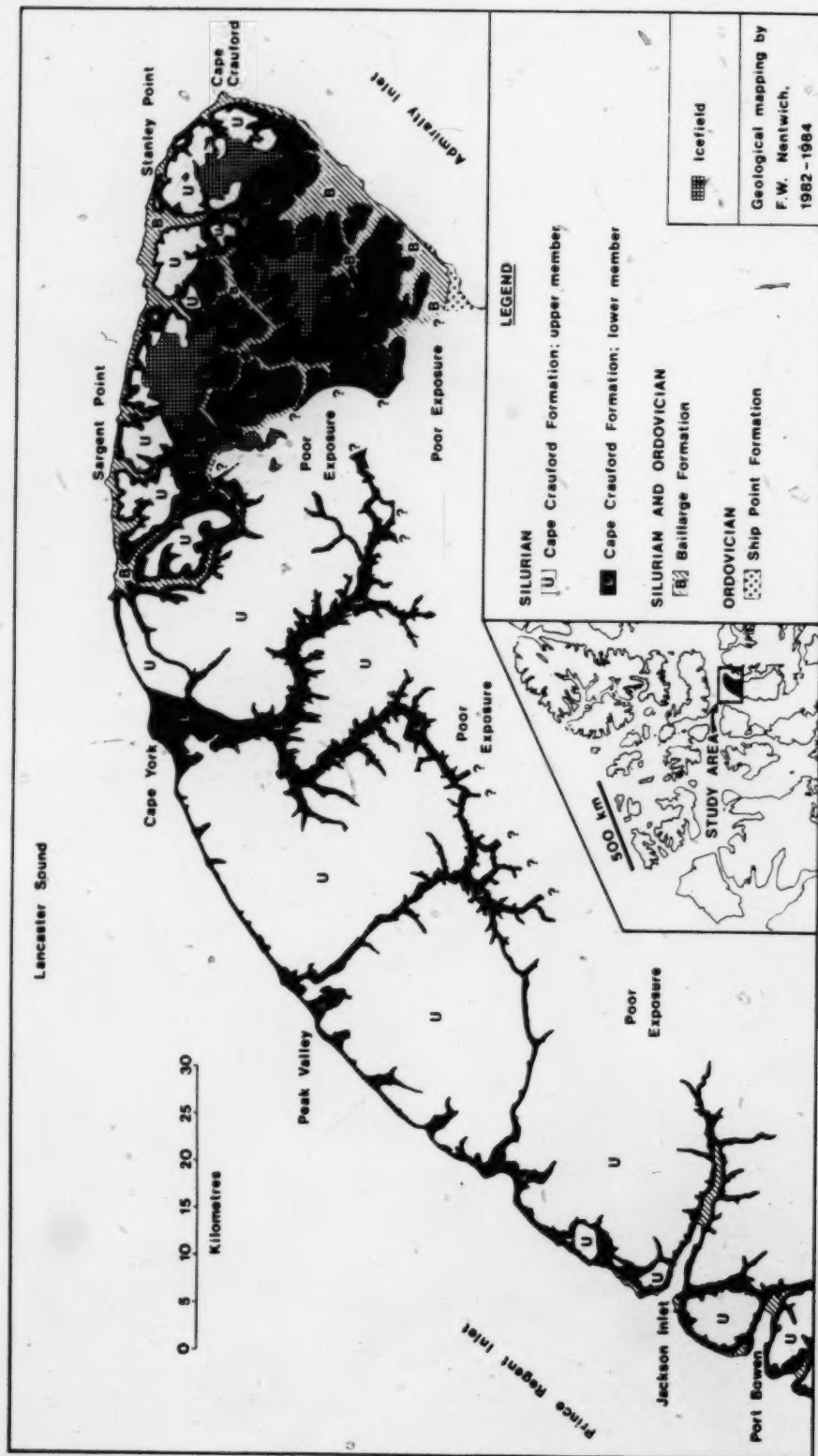


Figure 1.3 Bedrock geological map of northwestern Brodeur Peninsula with inset showing the geographic setting of the study area.

present study.

2. Refine the lithostratigraphic framework of the exposed strata on Brodeur Peninsula.
 - a. Define major lithostratigraphic units by measuring sections in detail.
 - b. Obtain photographic coverage of coastal cliff exposures to aid in correlation between sections and with oblique aerial photographs produce a geological map of the study area.
3. Refine the bio- and time stratigraphic framework of the Ship Point Formation and the Brodeur Group on Brodeur Peninsula by collecting macrofossil and conodont samples for later identification.
4. Improve upon earlier stratigraphic correlations with adjacent areas and establish lithofacies relations with evaporite-bearing strata elsewhere by:
 - a. Determining the stratigraphic and structural framework underlying water bodies adjacent to Brodeur Peninsula with the aid of seismic sections.
 - b. Refine the stratigraphy and sedimentology of Somerset Island by analysing drill cuttings from the Garnier O-21 borehole, northeastern Somerset Island. Then attempt a lithostratigraphic correlation with Somerset Island or an indirect correlation via the Ordovician-Silurian strata exposed on southern Devon Island.
5. Refine sedimentological understanding of the Ship Point Formation and Brodeur Group of northern Brodeur Peninsula by means of the following:
 - a. Determine depositional environments by analysing field and laboratory data.
 - b. Determine the diagenetic history by:
 - (i) Separating depositional from diagenetic effects.
 - (ii) Determining the relative timing of dolomitization, stylolitization and other diagenetic processes.
 - c. Concentrate on the origin of the breccias by:
 - (i) Reviewing breccia characteristics in the area in correlative as well as other stratigraphic units.
 - (ii) Establishing universal criteria by which carbonate and evaporite solution breccias may be differentiated in carbonate strata for use elsewhere.

6. Determine the relevance of this study to economic concerns, especially petroleum geology and mineral deposits.
7. Recommend further study.

C. METHODOLOGY AND CLASSIFICATIONS

Field Procedures

A total of four and a half months of field work was conducted over three field seasons. During this time, sections were measured at various coastal localities on Brodeur Peninsula (Fig. 1.4). Correlation between sections and mapping of the interior of the peninsula were considerably aided by 300 colour and 300 black and white photographs taken from a helicopter and Twin Otter aircraft at elevations varying from 500 to 2000 m asl along the flight paths shown in Figure 1.4. These were used in combination with a set of 1948 RCAF trimetrogon oblique aerial photographs taken from a height of 6100 m and a 1958 set of vertical aerial photographs (1:58,000). Standard field procedures were followed in measuring sections (Compton, 1962). The classification of stratal thicknesses used here follows Ingram (1954).

Rock colour proved to be of special importance. Colours that were described subjectively in the field were later compared with fresh surface colours of rock samples determined by means of a Munsell Soil Colour Chart (1975 edition). In this way, hue, value and chroma were determined for dry, slabbed and acid-etched samples. Colour names for the Munsell symbols were assigned according to Folk (1969). Samples with Munsell values of 2, 3 and 4 correspond to fresh surfaces which were consistently described as medium or dark brownish grey. Similarly, samples with values of 5 and 6 correspond with outcrop colours described inconsistently as light or medium brownish grey. Those with values of 7 and 8 were almost always referred to as buff or light brownish grey.

Rocks of the Brodeur Group are carbonates generally containing less than 10% clay, silt, organic or other material. Sand-sized non-carbonate material such as grains of quartz and

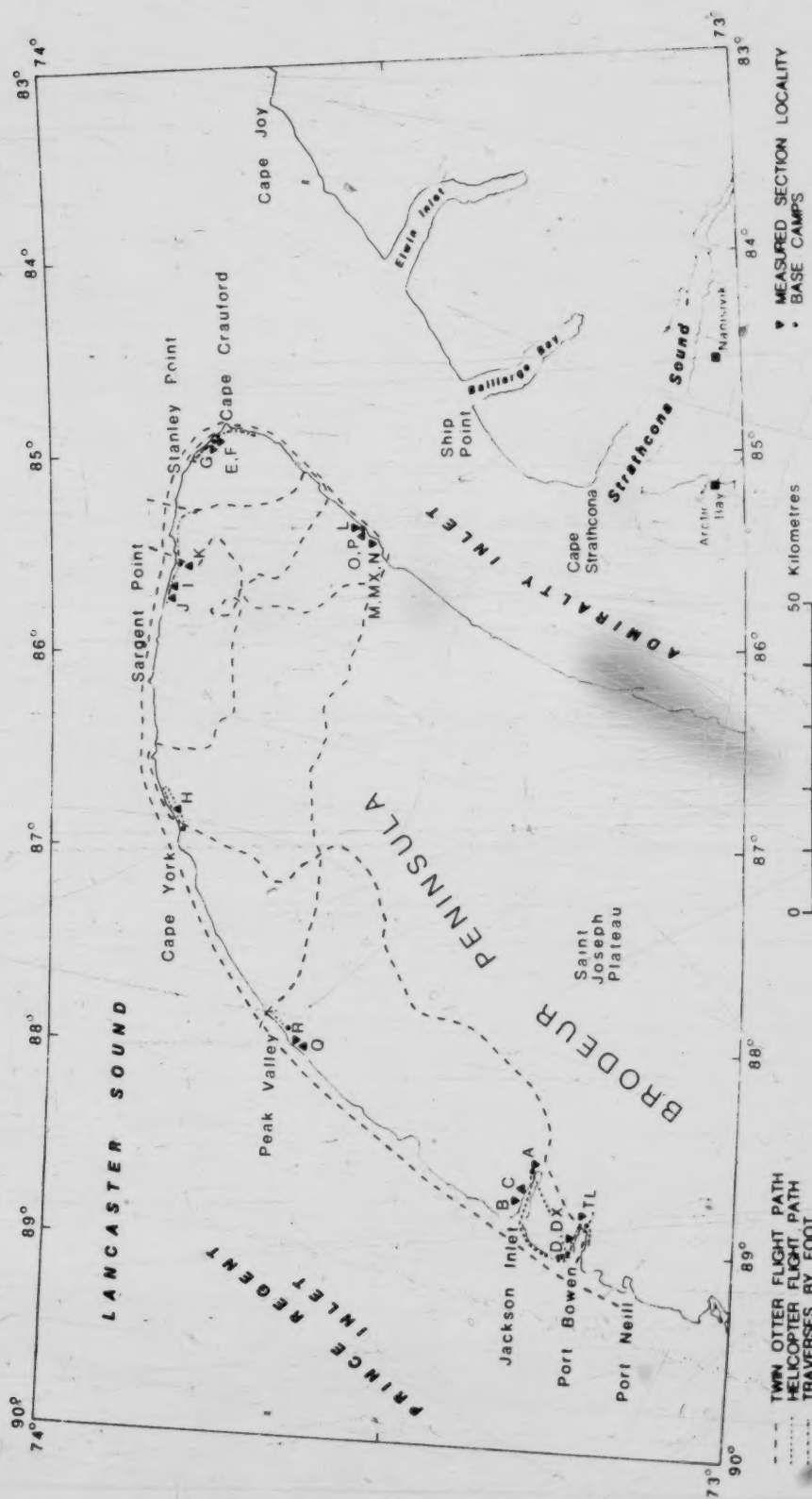


Figure 1.4 Sites of base camps, measured sections, flight paths along which colour photographs were taken and foot traverses.

other silicates are rare. Units were classified in the field as limestone (0-10% dolomite), dolomitic limestone (10-50% dolomite), calcareous dolostone (50-90% dolomite), dolostone (90-100% dolomite) or breccia. Later, petrographic studies showed that compositions and grain sizes determined in the field were too dolomitic and too coarse respectively.

Photographs, sketches and sample material with accompanying descriptive notes are kept in the Paleontological Collections at the University of Alberta. Descriptions of field units and samples are contained here in appendix 2.

Sample Preparation and Analysis

A slab was cut from the 550 lithology samples collected for this study. These were lapped with successively finer abrasives until smooth and then lightly etched in a dilute hydrochloric acid solution. One side was stained with an alizarin red S solution and was protected with a coat of clear polyurethane plastic. In addition, 353 thin sections were prepared, 250 of which were polished using 0.3 μ m-sized aluminum oxide powder on a vibratory polisher after the method of Mugridge and Young (1984).

Half of each thin section was then stained with an alizarin red S solution. The staining procedure outlined by Dickson (1965, 1966) was modified for a number of reasons:

1. An acid etch is required in order to distinguish stained ferroan calcite from stained ferroan dolomite, a procedure that is useful only where the dolomite crystals are larger than about 15 μ m or when higher power objectives are used. If dolomite crystals are less than this size they are removed during the preliminary acid etch, which if it is to be useful, must remove 10 to 15 μ m of calcite in the thin section. In rocks of the present study, crystals of calcite and dolomite are commonly small and intergrown.
2. All thin section stubs stained independently with only the potassium ferricyanide stain showed that ferroan carbonate was absent from all samples. There was therefore no necessity for distinguishing between ferroan varieties of calcite and dolomite.
3. The acid etch required in Dickson's (1965, 1966) method produces an irregular surface that causes focusing problems when taking photomicrographs with high-power objectives.

For all of these reasons Dicksons' method was modified as follows:

1. Half of each polished thin section was stained for about 45 seconds using a solution consisting of 2 grams of alizarin red S and 15 ml of HCL in 985 ml of water.
 2. After staining, thin sections were briefly dipped in water to remove excess staining solution.
- Even this method produced a $3\mu\text{m}$ etch which made photomicrography difficult with high power objectives.

Small corners of each thin section were also stained for Mg-calcite following the method of Choquette and Trusell (1978). As expected, magnesian-rich calcite was absent from the samples. Comparison of results obtained by staining slabs and thin sections showed that unlike the alizarin-red S and potassium ferricyanide staining methods the titan-yellow staining procedure is suitable only for thin sections. Some plexiglass peels were also made following the method of Frank (1965) but this was discontinued because the alizarin red stain dissolved in the solvent.

Binocular and petrographic microscopes were used to examine the slabs and thin sections and a Zeiss Jenamed Incident-Light Fluorescence Microscope was used for examining natural mineral fluorescence. The strongest fluorescent images were obtained with blue-violet excitation, though similar fluorescence was observed with ultraviolet and blue-light excitation. Almost no mineral fluorescence was observed under green-light excitation. Blue-violet excitation was used in the present study using a filter system comprising a B 226 excitation filter, a TS 450 dichroic mirror and a G251 barrier filter. This differs from the method advocated by Dravis and Yurewicz (1985) only in that blue-violet rather than blue-light excitation was used.

Cathodoluminescence of thin sections and slabs was observed with a Technosyn Cold Cathode Luminescence Model 8200 MkII mounted on a Zeiss Epignost-2 Incident-Light Microscope. Photomicrographs were taken using a beam voltage between 18 and 22 kilovolts and a gun current of about 500 microamperes. The photomicrography was accomplished with an Olympus OM-2 35 mm camera with an off-the-film reading light meter, a clear focusing screen and a focusing prism. Time exposures in excess of four minutes were required using

either 400 or 1000 ASA colour print film. The same camera system was used on the fluorescence microscope where light intensity was sufficient to be within the range of sensitivity of the automatic exposure system. For the sake of avoiding an unwieldy terminology, cathodoluminescence is referred to here simply as luminescence though technically, cathodoluminescence and fluorescence are different types of luminescence. Drill cuttings were described after washing a small quantity and staining with alizarin red S solution. These were also routinely crushed and examined as grain mounts in cross-polarized light to identify anhydrite and gypsum.

Conodont samples were prepared following in a general way the method outlined by Collinson (1963). Acetic acid was used to dissolve most of the calcareous samples but some of the pure dolostones required treatment with a 10% formic acid solution.

Sample Classification

Choice of a Carbonate Classification

There are a number of carbonate classifications to choose from, some based on texture e.g., Dunham (1962), others based on composition, still others based on a combination of these together with various genetic assumptions. The classification of carbonates used in this study is based on Folk (1959, 1962) but is modified to remove genetic connotations. The term micrite used here refers to all calcite crystals or grains less than $4\mu\text{m}$ in size irrespective of origin. It is therefore synonymous with Folk's (1959, 1962) term aphanocrystalline calcite together with part of the very fine calcitute category. The term microspar refers here to calcite crystals $4\text{--}16\mu\text{m}$ in size and is therefore synonymous with Folk's (1959, 1962) term very fine crystalline calcite. The term spar used here comprises calcite crystals larger than $16\mu\text{m}$ in size. The size class divisions from fine to extremely coarse crystalline are adopted directly from Folk's (1959, 1962) classification. There are few rocks containing micrite in the Brodeur Group. Presumably, most of the micrite (if originally present) was recrystallized to microspar. Adhering to the genetically restricted meaning of the term 'spar' as a pore-filling cement Folk (1959, p. 10) stated that

...the writer agrees that recrystallization is a very important process in some limestone formations, and the classification proposed here does not apply to recrystallized rocks.

If one redefines spar as all calcite crystals larger than $16\mu\text{m}$ in size, the classification is still useful and this is the course adopted here. Accordingly, if an allochem has recrystallized to spar but a ghost texture of the allochem is retained the percentage of allochem rather than spar is recorded in the present study.

In addition, Folk (1959, 1962) defined pellets as the fecal pellets of invertebrates, that they range from 30 to $150\mu\text{m}$ in size and that they are usually richer in organic matter than the non-pellet material. The pellets studied by Folk (1959, p. 7) "...have been obviously current-laid grains because they are interbedded with quartz silt and usually are delicately laminated and cross-bedded." Although pellet-like objects are very common in the Brodeur Group, evidence of their having been current-laid is usually absent. They commonly differ by being larger than $150\mu\text{m}$ and they are not enriched in organic matter. The term peloid is therefore adopted here (e.g., a pelmicrosparite is a microsparite containing peloids, not necessarily pellets). Another change to the original classification relates to the word dolomite which was first used to refer to both the mineral and to the rock. To comply with current useage the term 'dolomite' is replaced by the term 'dolostone'. Grain and crystal size classifications are adopted without change from Folk (1959, 1962) except that the terms calcilutite and calcarenite are replaced with the terms dololutite and dolarenite if the sample contains more than 50% dolomite. The coarser sizes, namely medium crystalline ($62\text{-}250\mu\text{m}$) to extremely coarse crystalline (larger than 4 mm) are not common in the Brodeur Group. The term 'biolithite', as used by Folk (1959, 1962), is avoided because of its genetic conotations. This excludes strata containing diagenetic hummocky structures (that mimic stromatolites) from being classified as stromatolitic biolithites. The biogenic dolostone category is divided here into fossil-bearing (1 to 10% fossils) and fossiliferous dolostone (more than 10% fossils).

Mottled dolomitic limestone is common in rocks of the Brodeur Group, especially member B of the Baillarge Formation. This rock was referred to as rubbly limestone by Jones

et al. (1979) because of its distinctive rubbly weathering appearance in the field and it is very common in the Upper Silurian Read Bay Formation on Somerset and Cornwallis islands. The rubbly mottled dolomitic limestone shown in Table 1 of Jones *et al.* (1979) is referred to here as mottled limestone. Accordingly, mottled limestone is accommodated in the modified Folk (1959) classification by adding the word 'mottled' before the rock name. The term mottle used here follows that of Bates and Jackson (1980, p. 411) who defined a mottle as "A small, irregular body of material in a sedimentary matrix of different texture (difference in color not being essential)...". This use of the term emphasises that mottles are not just weathering phenomena but are a three dimensional component of the rock. The mottles in the Ship Point Formation and Brodeur Group may be dolomitic or they may be calcified; they occur in matrices of variously dolomitic carbonate.

Classification of Breccias

There are numerous genetic terms that have been applied to breccias formed by collapse resulting from dissolution of soluble minerals. The problem with these is that the origin of the breccia is commonly in doubt. The use of genetic breccia classifications is discussed in chapter IX. The classification of breccias used here is non-genetic and follows Morrow (1982). In this descriptive classification, the terms crackle, mosaic and rubble breccia refer to the spatial relationship between fragments. According to Morrow (1982, p. 227)

A crackle breccia denotes a fabric in which there is little relative displacement of fragments; a mosaic breccia is characterized by fragments that are largely but not wholly displaced; and rubble breccia signifies a fabric in which no fragments match.

Further division is based on whether the material between fragments is void space (*open*), filled by chemically precipitated minerals (*cemented*) or filled with subgranule-sized (<2 mm) grains (*particulate*). The term *packbreccia* and *floatbreccia* are used to distinguish fragments that are largely in contact from those that are floating in 'matrix'. A *particulate rubble floatbreccia* would therefore be an example of Morrow's (1982) complete use of the classification.

Many of the crackle breccias of Brodeur Peninsula are perhaps better classified as stylobreccias which are defined as breccias in which "...fragments are bound by stylolites

caused by fracturing accompanied by pressure solution." (*in* Flügel, 1982, p. 94). In general, the breccias of Brodeur Peninsula are packbreccias in the classification of Morrow but the term has not been used here because of varying outcrop conditions. An estimate of 'matrix' versus 'clasts' was made, however whenever possible. In the present study all fragments larger than 2 mm were arbitrarily referred to in the field as clasts (synonymous with fragments) and all material <2 mm in size was classified as 'matrix'. The term 'matrix' as used here therefore encompasses both cement and particulate material <2 mm in size. Diagenesis in the breccias has been extensive and it is therefore difficult or impossible to distinguish original cement from recrystallized particulate material. 'Clasts' and 'matrix' are considered separate rock types for classification purposes. Each is assigned a name according to the method modified after Folk (1959, 1962) described earlier.

II. EARLY EXPLORATION AND PREVIOUS GEOLOGICAL INVESTIGATIONS ON NORTHERN BRODEUR PENINSULA

Port Bowen (Fig. 1.2) was visited by Parry in 1819 (Parry, 1835, p. 52) who stated that

The cliffs on the south side of this bay, to which I gave the name of Port Bowen, resemble, in many places, ruined towers and battlements; and fragments of the rocks were constantly falling from above.

The surgeon and naturalist, Dr. Neill, on Parry's third expedition in 1824 noted that cliff exposures along the eastern shore of Prince Regent Inlet consist of horizontally stratified limestone (*in* Parry, 1826, p. 91). A sledge trip from Port Bowen along the coast to beyond Cape York was led by Lieutenant James Ross in the spring of 1825 who wrote that near Cape York (Fig. 1.2) "...the strata, which are chiefly horizontal, or nearly so, dipped to the N.W., at an angle of about ten degrees, the cliffs overhanging in a fearful manner at that part..." (*in* Parry, 1826, p. 86). A second sledge trip ventured 55 km due east into the interior and a third was conducted south along the coast a distance of about 110 km. Rock collections, which included some samples from Somerset Island, were briefly described by Jameson (*in* Parry, 1826) and the fossils were later re-examined by Lee (1912) who reservedly assigned them to the Guelph. Later, Captain John Ross (1835) noted that the strata at Cape York consisted of limestone and Haughton (*in* McClintock, 1859) remarked on a single colonial coral specimen collected at Cape York.

In 1911 Alfred Tremblay explored the Cape Crauford area and the cartographer J. Lavoie crossed Brodeur Peninsula from Admiralty Inlet to Port Bowen where some fossils were collected (*in* Bernier, 1912). Of the geology of the interior he remarked that "This part of the country is entirely composed of greyish limestones, finely broken and without traces of any fossils." (*in* Bernier, 1912, p. 92).

During the Fifth Thule Expedition in 1924 Peter Freuchen collected two colonial corals at Stanley Point (Mathiassen, 1933) that were later identified by Teichert (1937) as *Favosites niagarensis* Hall and *Favosites* cf. *F. favosus* Goldfuss. On the basis of this and other fragmentary evidence Teichert (1937) produced a geological map of Baffin Island in which strata in the vicinity of Port Bowen and Stanley Point were shown as Niagaran.

The geology along the coast of Admiralty Inlet was studied in 1954 by Lemon who designated the type section of the Baillarge Formation at Baillarge Bay (Fig. III.8, locality 9) on the east coast of Admiralty Inlet (Lemon, 1956; Lemon and Blackadar, 1963). In 1955 during the Geological Survey of Canada's 'Operation Franklin' Norris (1963) spent one week on Brodeur Peninsula during which sections were measured at Port Bowen, Jackson Inlet, and Sargent Point. Norris (1963) informally divided the strata into a lower limestone, a middle brecciated limestone, and an upper limestone, all of which he assigned to the Read Bay Formation.

In 1961 Yorath and High-Wo (*in de Wit and Sproule*, 1962) measured a composite section comprising the upper 134 m of the Baillarge Formation and all of the Cape Crauford Formation in the interior of the Peninsula about 25 km south of Cape York. Two weeks of geological field work were undertaken in 1963 by Trettin (1965a) who measured sections at Jackson Inlet, Sargent Point, and Cape Crauford. Stromatoporoids collected during this work were studied by Petryk (1967) who identified 14 species.

The stratigraphic framework developed by Norris (1963) was revised and formalized by Trettin (1965a, b; 1969) for the following reasons:

1. Recognition of the Baillarge Formation on Brodeur Peninsula. Correlation showed that part of the lower limestone unit of Norris (1963) was included in the Baillarge Formation.
2. Strata overlying the Baillarge Formation contain solution breccias and are therefore lithologically distinct from the unbrecciated strata of the Read Bay Formation on Cornwallis Island.

Together, the Baillarge and Cape Crauford formations were assigned to the Brodeur Group (Trettin, 1965b). A provisional geological map which includes Trettin's 1963 work was published by the Geological Survey of Canada (Blackadar *et al.*, 1968). A brief progress report was prepared by Heise (1970) for Transalta Oil and Gas Ltd. and a photogeological report was completed for Chevron Standard Ltd. by Howell (1970) but no field work was undertaken in these two studies.

The peninsula was later investigated by J.C. Sproule and Associates from June 12 to June 28, 1970 (*in* Mayr and Harding, 1971). Sections were measured through the upper part of the Baillarge Formation and the Cape Crauford Formation on the north coast of Brodeur Peninsula, 13 km west of Stanley Point. In addition, the reference section of the Baillarge Formation was measured in coastal cliff exposures about 26 km southwest of Cape Crauford. Structural mapping was undertaken in the area north of latitude 73°20'N and west of 86°30'W by means of helicopter and foot traverses. Further geological work by Sproule and Associates Ltd. during the same period is described in Miall and Harding (1971). A photogeological mosaic between latitudes 73°30'N and 73°40'N and longitudes 87° and 88° in their report shows that the Cape Crauford Formation covers most of this area except for the core of a small anticline in the southeast where the Baillarge Formation is exposed. Finally, mineral exploration on Brodeur Peninsula was conducted by Cominco Ltd. and by Monopros Canada Ltd. (Hudson Bay Mining and Smelting Co.) during 1982, but these works are confidential and are therefore unavailable. Aspects of the geology have been discussed briefly in interim reports by Nentwich and Jones (1983, 1984a, b, c, 1985a, b, 1986) and Jones and Nentwich (1986).

III. REGIONAL GEOLOGICAL SETTING AND EVOLUTION OF TECTONIC ELEMENTS

A. INTRODUCTION

It was suggested previously that the breccias of Brodeur Peninsula were formed by the dissolution of evaporites (Norris, 1963; Trettin, 1965a, b; Mayr, 1978). These hypothesised evaporites were considered to have been present in strata lithostratigraphically correlative with evaporite-bearing strata on northeastern Somerset Island. Therefore, one of the main thrusts of this study has been to re-examine the regional stratigraphic correlations, especially with Somerset Island. The large expanse of inland waterways around Brodeur Peninsula has, however hindered understanding of the regional tectonic setting as it pertains to the evolution of Ordovician and Silurian tectonic elements, especially basin development (Fig. III.1). In this chapter, all available geological and geophysical information is integrated in an attempt to solve this problem.

B. ARCHEAN-APHEBIAN

Two large, exposed Archean-Aphebian granitic-gneiss terrains occur in the vicinity of Brodeur Peninsula; one along Boothia Peninsula and western Somerset Island and the other east and southeast of Brodeur Peninsula (Figs. III.1, 2). Archean-Aphebian rocks are also exposed on eastern Devon Island. On Borden Peninsula (Fig. I.1), Precambrian rocks include a variable complex of high-grade gneisses (Jackson and Iannelli, 1981) whereas on Somerset Island the composition is more variable with denser mafic rocks (Brown *et al.*, 1969). According to Gregory *et al.* (1961) these terrains are characterized by positive magnetic anomalies with superimposed high amplitude/short wavelength magnetic anomalies (Figs. III.3, 4). The Boothia Uplift (Fig. III.2), the major tectonic feature in the area, was emergent at various times in the Precambrian and Paleozoic because unconformable reflections on seismic sections increase in number and strength westward toward the Uplift (Ball, 1973). This is also known from stratigraphic studies on Somerset Island (Miall and Kerr, 1980) and on Prince of Wales Island (Mortenson, 1985; Mortenson and Jones, 1986). Okulitch *et al.*

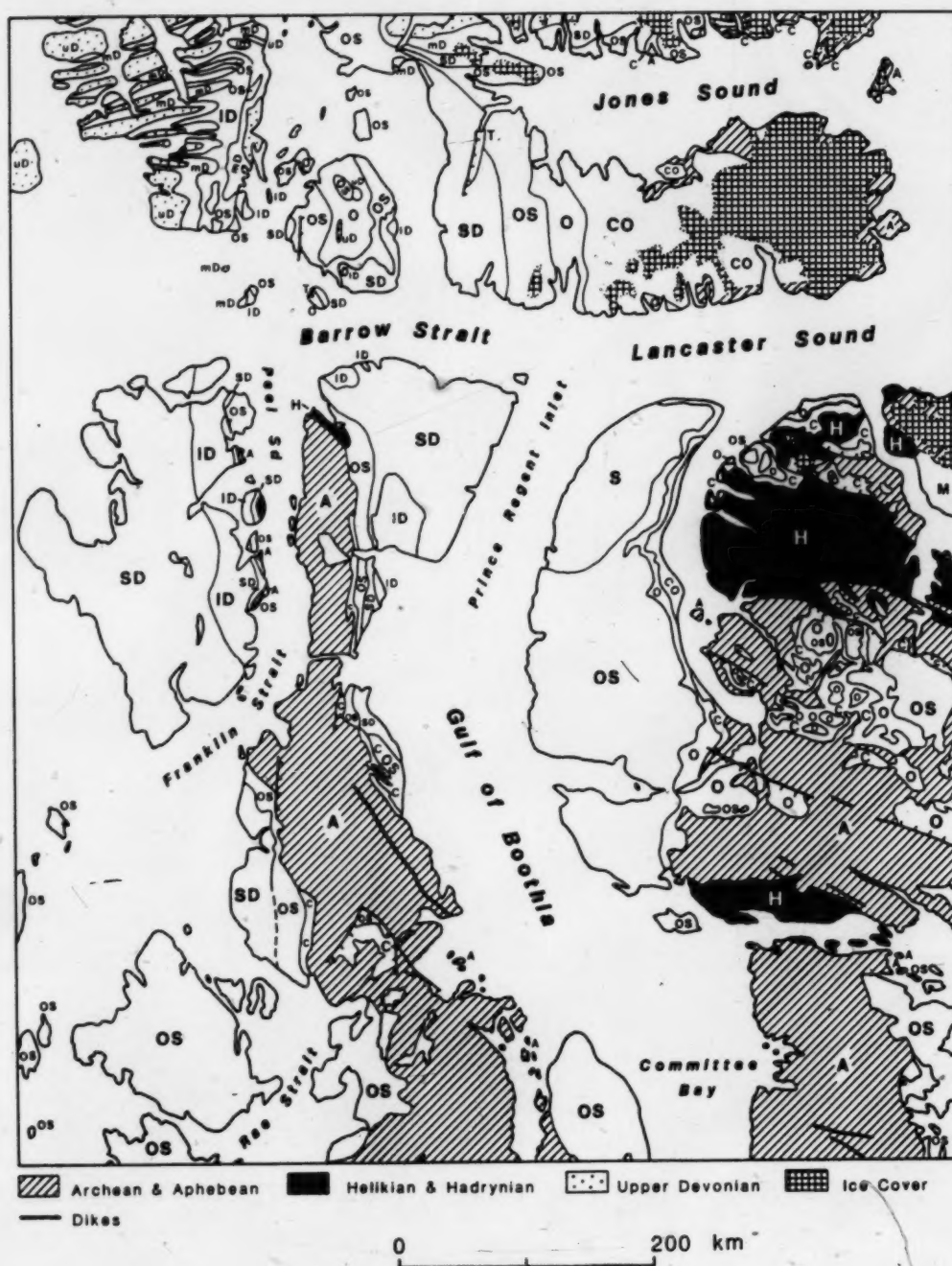


Figure III.1 Geology simplified and adapted from GSC map 1250A: T: Tertiary; M: Mesozoic; uD, mD, and lD: Upper, Middle and Lower Devonian; S: Silurian; O: Ordovician; C: Cambrian.

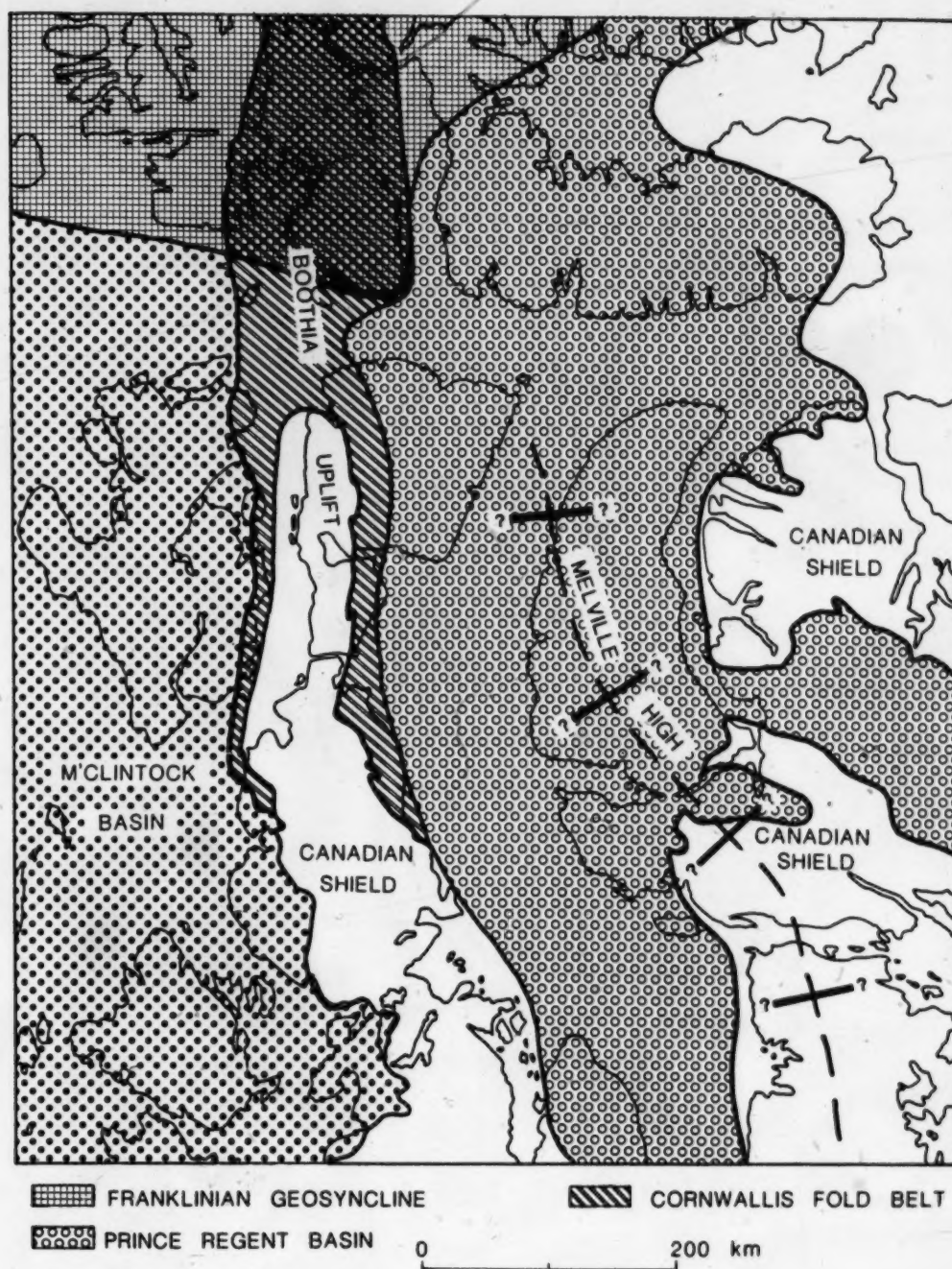


Figure III.2 Stratigraphic-structural provinces of the south-central Canadian Arctic Archipelago, modified from Miall and Kerr (1980) and Mayr (1978).

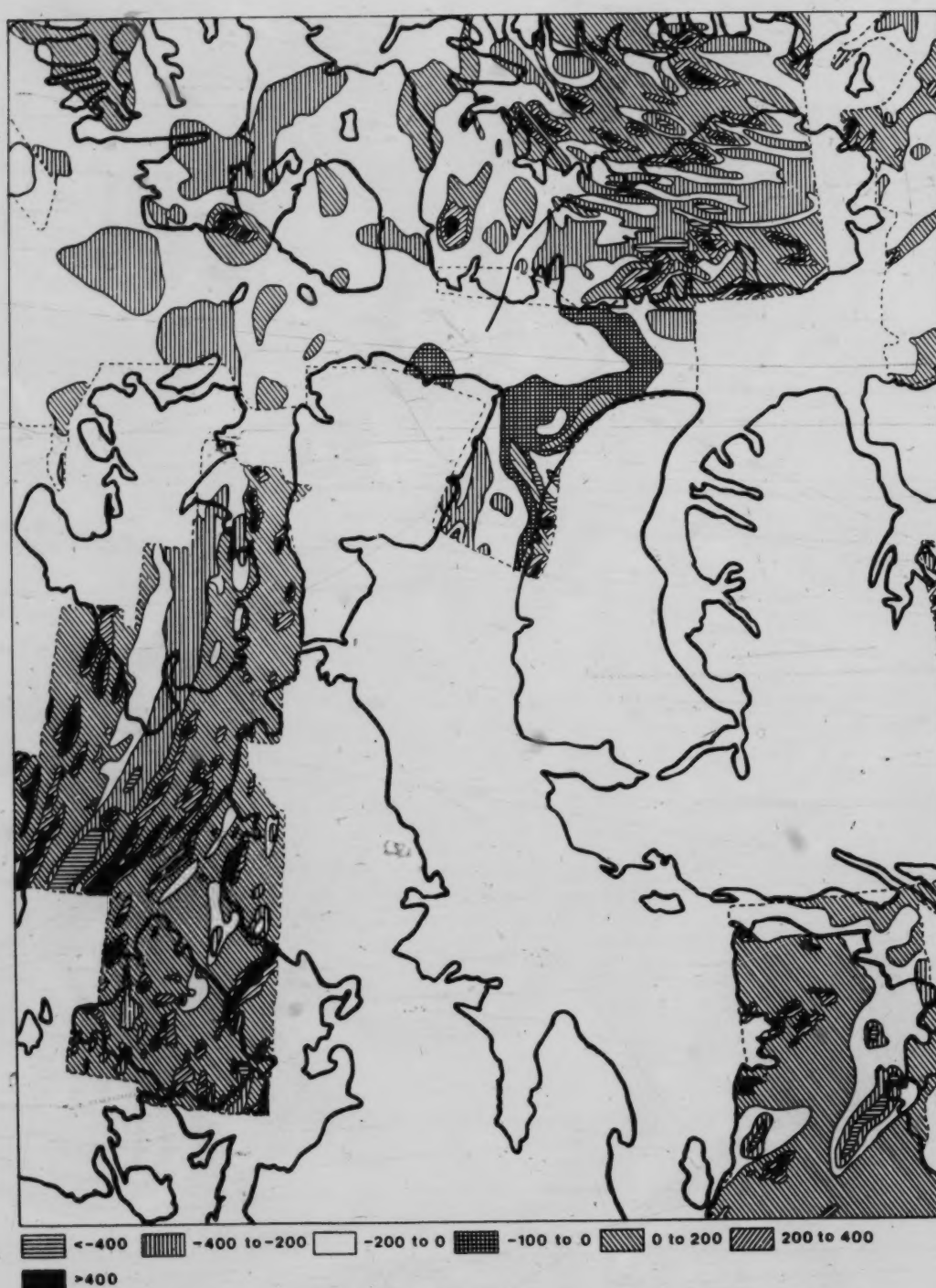


Figure III.3 Magnetic anomaly map generalized and modified from the Geological Survey of Canada/Indian and Northern Affairs Map 1512A. Intervals are in gammas. Dashed lines define the limits of the data.

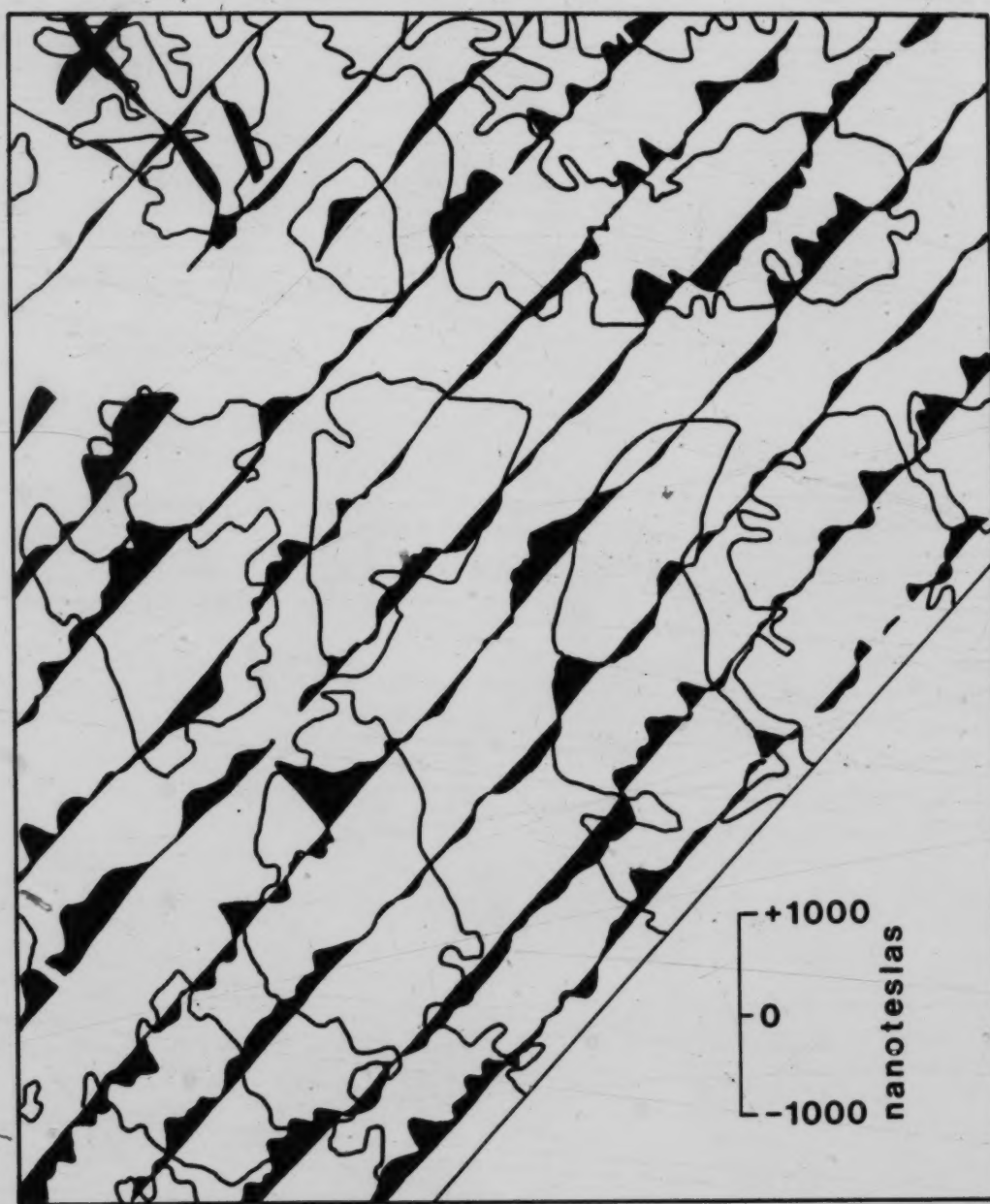


Figure III.4 Magnetic profiles (z residuals, 3rd degree polynomial), adapted from Coles *et al.* (1978).

(1986) considered the Boothia Uplift to be a west-directed, east-dipping thrust formed during the Late Caledonian orogeny associated with closure of the Iapetus Ocean in Wenlockian times. The angle of the presumed thrust faults is, however rather loosely constrained by geological and regional gravity data and may be low- or even high-angle reverse faults rather than thrust faults. The gravity model that Okulitch *et al.* (1986) cited in support of thrust faults should be used with caution because the gravity data is based on rock densities obtained at the surface. The predicted change in density with depth is a variable that may not be correct. Other supporting data are needed, such as more studies across the west flank of the Boothia Uplift, before the problem can be fully resolved.

The negative bouguer anomalies associated with the exposed gneisses of southern Borden Peninsula may be due to a southeastward regional increase in crustal thickness (Berkhout, 1973). The northeast-trending, high-gradient, gravity high on Brodeur Peninsula, centered just north of Jackson Inlet (Fig. III.5) suggested a relatively shallow source to Berkhout (1970, p. 127) who postulated that there was "...possibly a buried step due to a fault contact between Upper Proterozoic quartzitic rocks and gneisses; the top of this step may lie at a depth of 3 to 4 km." He further proposed that this basement uplift was a landmass during and before the Late Proterozoic that could have been the source of sediments for adjacent basins now characterized by gravity lows (Berkhout, 1970). The best example of this is the gravity low centered about 90 km southwest of Arctic Bay (Fig. I.1) which represents the westward extension of the Borden Basin across Admiralty Inlet. More recent gravity data (EMR, open file 85-26) that is incorporated in Fig. III.5 shows that there are separate gravity highs over southeastern Somerset Island and northwestern Brodeur Peninsula and that a single northeast-trending gravity high over Prince Regent Inlet as originally assumed by Berkhout (1970, 1973) is non-existent. The new gravity data is in better agreement with the dominantly northwesterly trend of the magnetic anomalies (compare Figs. III.3, 4 and 5). The most prominent magnetic feature in Prince Regent Inlet is the positive 0-200 gamma anomaly that extends from southwest of Port Bowen, Brodeur Peninsula, northwest toward the northeastern tip of Somerset Island. This anomaly probably represents

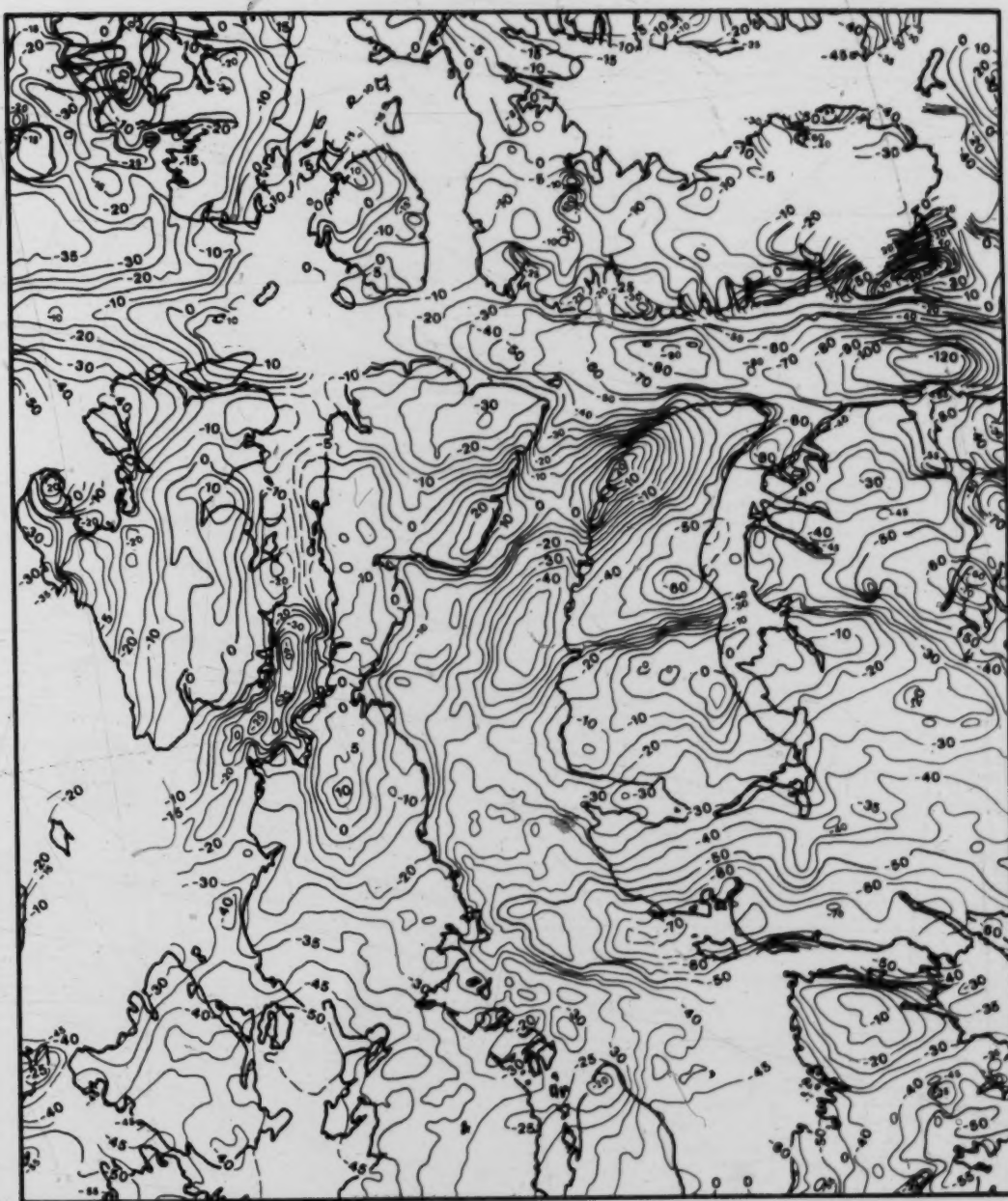


Figure III.5 Gravity map (Bouguer on land, free air offshore), compiled and adapted from 1980 and 1981 maps 72080, 76088, 76064, 72064, 72096, 68080, 68096, 68064 and open file 85-26, Energy, Mines and Resources, Canada. Contours in milligals.

the extension of all or part of the Melville High under Prince Regent Inlet. It has a very subdued magnetic and gravity expression in the western half of Prince Regent Inlet along the seismic line in Fig. III.6. Unfortunately, the seismic data obtained along this line was of very poor quality and consequently was not interpreted (Ball and Lack, 1972).

The Melville High may also be an east-dipping west-directed thrust similar to that proposed by Okulitch *et al.* (1986) for the Boothia Uplift. Gregory *et al.* (1961) estimated that the depth to basement near the middle of Prince Regent Inlet was over 3 km. However, the flight line crossed the anomaly at a high angle. Inherent in the depth calculation used by Gregory *et al.* (1961) is the assumption that the profile is at right angles to the strike of a magnetized body having very steep boundaries with dips greater than 50°. This would not be the case for an eroded Precambrian high flanked by Proterozoic sediments. The positive magnetic anomaly is accompanied by a positive gravity anomaly which implies that the Paleozoic rocks are underlain by Archean and Aphebian rocks at shallow depth. The continuity of the magnetic anomaly into Prince Regent Inlet from Brodeur Peninsula (Fig. III.3) suggests that there is no fault parallel to and near the coast at this locality. However, the positive 0-200 gamma NW-SE trending magnetic anomaly just offshore from Brodeur Peninsula between Peak Valley and Cape York (Fig. III.3) may be an expression of a fault that swings westward into Prince Regent Inlet before reaching Jackson Inlet. The gravity high on eastern Somerset Island near Fury Point is associated with strong negative magnetic anomalies, consistent with a higher density Archean/Aphebian basement at greater depth (Berkhout, 1973). On Somerset Island Berkhout (1973) suggested that the gravity information was consistent with a 2 km thick sedimentary section overlying a basement having an assumed density of 2.81 kg/m³. This is in keeping with a depth to magnetic basement of 1.5 to 3 km over southeastern Somerset Island and contrasts with a 0.9 to 1.5 km depth calculated for Brodeur Peninsula at a locality 20 km south of Port Bowen (Gregory *et al.*, 1961). A low-altitude aeromagnetic survey which includes northern Brodeur Peninsula was conducted by the Department of Energy, Mines and Resources during the summer of 1984 and when available will undoubtedly further refine our knowledge of the area (P. Hood, EMR, oral.

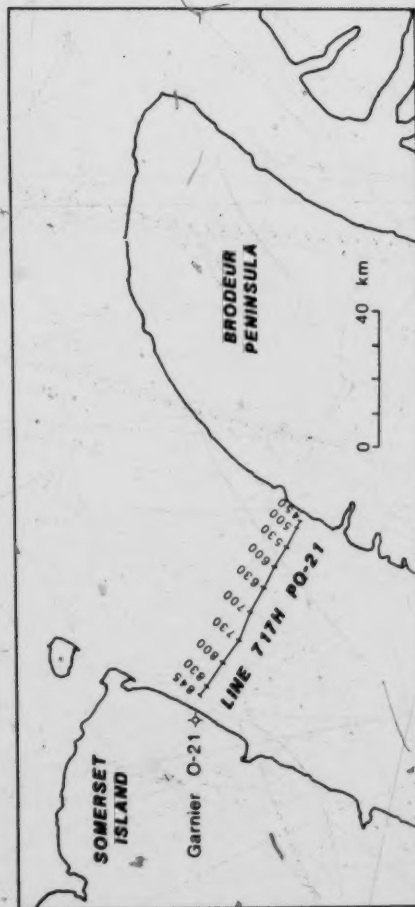
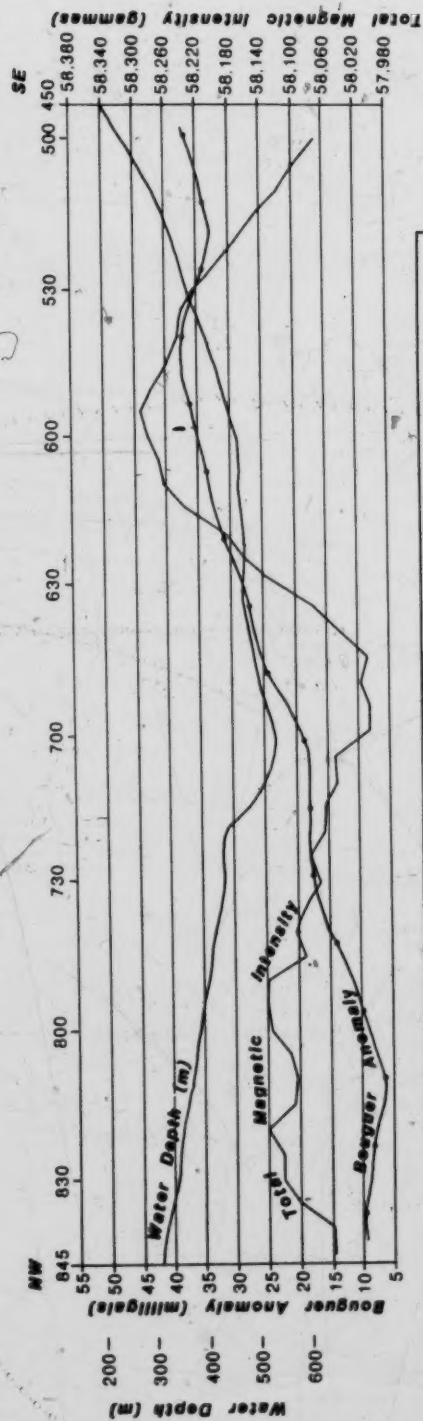


Figure III.6 Bathymetric, seaborn magnetic and gravity profiles along seismic line 717H PQ-21 (modified from Ball and Lack, 1972).

comm., 1984).

C. HELIKIAN-HADRYNIAN

The Borden Basin is an aulacogen that formed during the opening of the Proto-Arctic (Poseidon) Ocean (Jackson and Ianelli, 1981). According to Jackson *et al.* (1985) this rifting event occurred between 1200 and 1250 Ma. The Borden Basin of northern Borden Peninsula was filled with 6100 m of Helikian and Hadrynian strata known as the Bylot Supergroup (Fig. III.1). The Bylot Supergroup unconformably overlies an Archean/Aphebian gneiss complex that has been divided by Jackson and Ianelli (1981) into a lower clastic sequence (Eqalulik Group), a middle carbonate succession (Uluksan Group) and an upper clastic interval (Nunatsiaq Group).

The paleocurrent directions (east-northeast to southeast) together with other data derived from the Elwin Formation (the uppermost formation of the Nunatsiaq Group) suggest that some detritus was derived from areas now occupied by northern Brodeur Peninsula or Devon Island (Jackson and Ianelli, 1981). This contrasts with the westerly transport directions derived for all the underlying formations and suggests that Brodeur Peninsula may have been emergent in the late Proterozoic. This may be the first evidence of uplift along the Melville High (Fig. III.2) which must have formed in the Late Neohelikian after the rifting event that formed Borden and related basins.

The Bylot Supergroup also contains plateau basalts of the Nauyat Formation which have been intruded by Hadrynian Franklin diabase dikes and an older 950 Ma dike swarm (Jackson *et al.*, 1985). On southeastern Devon Island there are very few Hadrynian and Helikian rocks although the Strathcona Sound Formation rests unconformably on basement gneisses (Narbonne, *in* Jackson and Ianelli, 1981). The Fury and Hecla Basin, about 200 km to the south around Fury and Hecla Strait (Fig. I.1), formed at the same time as the Borden Basin (Fahrig *et al.*, 1981) during the same rifting event and also contains about 6 km of sedimentary strata (Jackson and Ianelli, 1981). On northwestern Somerset Island over 3 km of Neohelikian strata (the Aston and Hunting formations) are preserved (Jackson and Ianelli,

1981). Because the density of these sedimentary rocks are about 2.6% less than the basement gneisses this area is characterized by large negative bouguer anomalies (Bérkhout, 1973). It is clear from the bouguer anomaly map (Fig. III.5) that the Borden Basin extends southwestward under Admiralty Inlet and is present beneath the Paleozoic cover of Brodeur Peninsula. The Fury and Hecla Basin and the area of exposed Proterozoic sediments on northwestern Somerset Island are also characterized by large negative bouguer gravity anomalies.

D. CAMBRO-ORDOVICIAN

On Borden Peninsula the Gallery Formation rests with low angular unconformity on the Precambrian; it is up to 343 m thick and essentially consists of quartzose sandstone (Trettin, 1969). Isopachs, grain size trends and paleocurrent directions show that the sediments were deposited in a basin centered on Borden Peninsula (Trettin, 1969). A sandstone, as opposed to a granitic source, on northern Brodeur Peninsula was implied from the paleocurrent data and composition of the Gallery Formation in the Strathcona Sound-Adams Sound area (Trettin, 1969). The Turner Cliffs Formation (29-307 m thick) is dominantly a clastic unit of very shallow marine origin. A northwestern source was proposed for the formation in the northern part of the Admiralty Basin by Trettin (1969) which suggests that the Melville High continued as an emergent area into the Lower Ordovician. Mayr (1978) originally postulated that because the partial section of the Turner Cliffs Formation in the Garnier well was thicker than the sections in the Admiralty Inlet area, the Melville High must lie on Brodeur Peninsula between the two areas. However, the Turner Cliffs Formation in the borehole was later reassigned to the Cass Fiord Formation and an overlying unnamed unit (Mayr *et al.*, 1980) which was referred to as the Cape Clay Formation by Okulitch *et al.* (1986). Although this reassignment calls into question the earlier reasoning for placing the Melville High on Brodeur Peninsula there is other data that supports this idea. In particular, Daae and Rutgers (1975) showed that the maximum thickness of the Precambrian to Cambrian section is north of Cape Admiral M'Clintock, northeastern

Somerset Island (Fig. I.1).

On southwestern Devon Island, the entire Phanerozoic section has a composite thickness of only 2.3 km in the Radstock Bay to Maxwell Bay area (Fig. I.1) (*in* Miall and Harding, 1971). On eastern Devon Island about 460 m of Cambrian and Lower Ordovician beds occur between the basement gneisses and the Eleanor River Formation (Christie, 1977).

E. ORIGIN OF LANCASTER SOUND, ADMIRALTY INLET AND PRINCE REGENT INLET

Lancaster Sound

Lancaster Sound is a complex half graben that formed as an aulacogen in the Cretaceous to Tertiary Eureka rifting episode (Kerr, 1980). Cretaceous basins in Lancaster Sound north of Prince Regent Inlet and north of Borden Peninsula are separated by a structural high extending NNW from northern Brodeur Peninsula (Dae and Rutgers, 1975). This structural high may represent either carbonates over a Precambrian basement high or an upthrust section (Ball, 1973). The half graben of Lancaster Sound (Fig. III.7), in which the Cretaceous section thickens dramatically northward, has been shown in numerous interpreted seismogeological sections (Lack, 1972b,c). This is generally in keeping with the work of Barrett (1966) who estimated a depth of 5 km to magnetic basement in the vicinity of Devon Island. An extremely high magnetic gradient of 800 gammas over a distance of 10 km occurs across the Devon Fault in the vicinity of Powell Inlet, Devon Island (Fig. I.1, III.3, 4 and 7) where the highly magnetic Aphebian granitic gneiss lies adjacent to a thick non-magnetic Cretaceous-Tertiary sequence in northern Lancaster Sound (Figs. III.1, 7). Note that the Devon Fault of Hea *et al.* (1980) has also been referred to as the Parry Channel Fault by Kerr (1980). The Bouguer anomaly profile accompanying Fig. III.7 shows that gravity values decrease southward, opposite to that expected for a low density northward thickening Cretaceous sequence. This effect occurs all along Barrow Strait and Lancaster Sound where the most negative bouguer anomalies are displaced south of the maximum thickness of

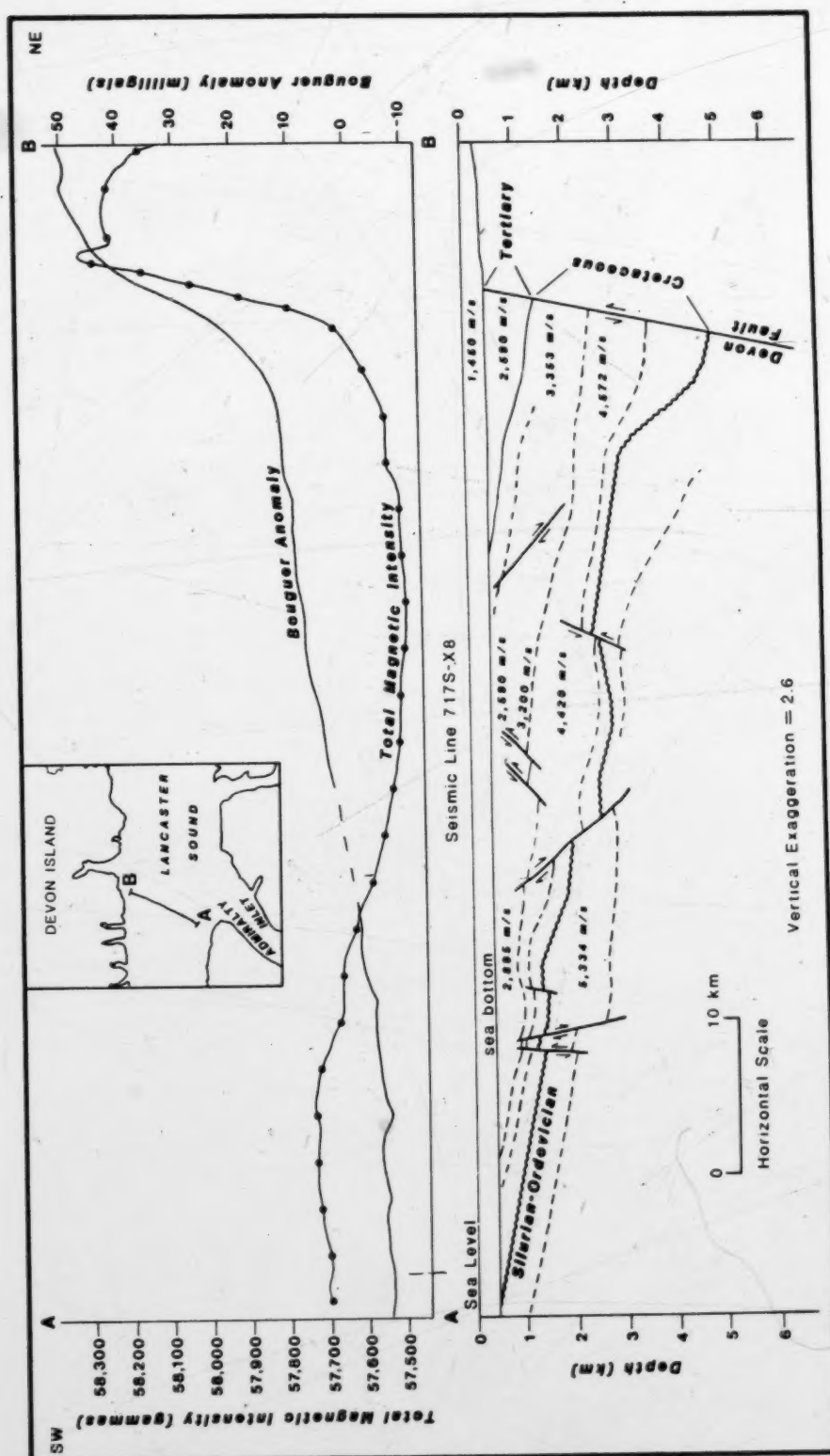


Figure III.7 Seismo-geological interpretation across Lancaster Sound, based and modified from a time structure interpretation by Lack (1972b). Two-way times were converted to depth using the posted velocities.

Cretaceous-Tertiary strata (Fig. III.5). Crustal thinning due to an 8 km northward displacement of Devon Island with respect to Baffin Island (Barrett, 1966) may be responsible for the observed negative Bouguer anomaly trough along the south side of Lancaster Sound. Lack (1972b) proposed that this anomalous situation is due to a crustal transition zone. The gravity data may also be affected by a northwardly truncated Proterozoic section overlain by a northwardly thinning Paleozoic section (Kerr, 1980).

Prince Regent Inlet

It has been proposed, largely on the basis of the aeromagnetic data of Gregory *et al.* (1961), that Prince Regent Inlet is a west-dipping half-graben (Heise, 1970). This view is supported by the gravity data which show a southward deflection of the gravity contours along the east coast of Somerset Island (Fig. III.5). A positive 0-200 gamma northeast-trending anomaly parallel to the coast of Brodeur Peninsula between Cape York and Peak Valley and extending south almost to Jackson Inlet (Fig. III.3) may be due to exposure or near exposure of the Precambrian along a fault scarp named the Brodeur Peninsula Fault by Kerr (1980).

As a general rule the seismic data in Prince Regent Inlet is of poor quality because of a hard, high-velocity layer of probable Ordovician-Silurian strata at or near the water bottom (Lack, 1972b, 1974). Seismic line 717H PQ-20, which extends parallel to and 10 km offshore from Somerset Island between Port Leopold and Elwin Bay (Fig. I.1), was interpreted by Ball and Lack (1972) as an Ordovician-Silurian section at or near the water bottom with a slight northward dip along the line of section. This is opposite to the apparent southward dip along the east coast of Somerset Island (Stewart and Kerr, 1984a). An extension of the Melville High is not visible on the interpreted seismic section which suggests that it terminates before reaching Somerset Island or that it is too broad to be detected. On the basis of limited and poor quality reflection seismic data, Fellows and Lack (1971) proposed that the half-graben in Lancaster Sound has a definite shallow branch which deepens to the southwest into Prince Regent Inlet. The west-bounding fault of the half-graben near the east coast of Somerset

Island has been named the Prince Regent Fault by Kerr (1980). Gravity and magnetic data suggest that this is at least true for the northern part of the inlet. Interpretation of three seismic sections in central Prince Regent Inlet between Fury Point and Elwin Bay (Fig. 1.1) by Lack (1972d) showed Ordovician-Silurian strata at or near the water bottom. If this is true then a thick Cretaceous section such as occurs under most of Lancaster Sound is absent in Prince Regent Inlet. An exception is the extreme northern part of the inlet where it connects with Lancaster Sound. A horizon tentatively picked as the top of the Ordovician on the seismic sections in the Fury Point-Batty Bay area occurs about 2500 m below the water-bottom (assuming a 5828 m/s velocity derived from the Garnier O-21 well). The thickening of sedimentary section in Prince Regent Inlet, as first proposed by Gregory *et al.* (1961) on the basis of aeromagnetic data, is therefore caused by a thickening of the Paleozoic and Proterozoic as opposed to Cretaceous sediments. The northwest-trending positive 200 gamma magnetic high that extends into Prince Regent Inlet from south of Port Bowen and postulated here to be an extension of the Melville High may represent an Archean-Aphebian erosional remnant flanked on either side by Proterozoic-Paleozoic strata. The magnetic anomalies become generally more negative in a southwest direction across Prince Regent Inlet (Fig. III.3) and there is a prominent -200 to -400 gamma anomaly that parallels the east coast of Somerset Island. Taken collectively the data suggest that Prince Regent Inlet is underlain by a west-dipping half graben (Fig. III.8). The vertical displacement along the Prince Regent Fault must be small because gravity contours are not noticeably displaced. In this regard, Cretaceous fault-bounded basins in Lancaster Sound and Admiralty Inlet are normally reflected by sea-bottom scarps where fault displacements are large (as for example the Devon Fault) and this is not the case in Prince Regent Inlet.

Jones (1974) proposed a low-lying landmass east of Somerset Island to explain the paleocurrent data and the high percentage of immature clastic material in the Leopold Formation. Uplift along the Melville High could have exposed a granitic core in the area presently covered by Prince Regent Inlet and would be a logical source of the immature clastics. It is also possible that the Prince Regent Fault was originally a reverse fault formed

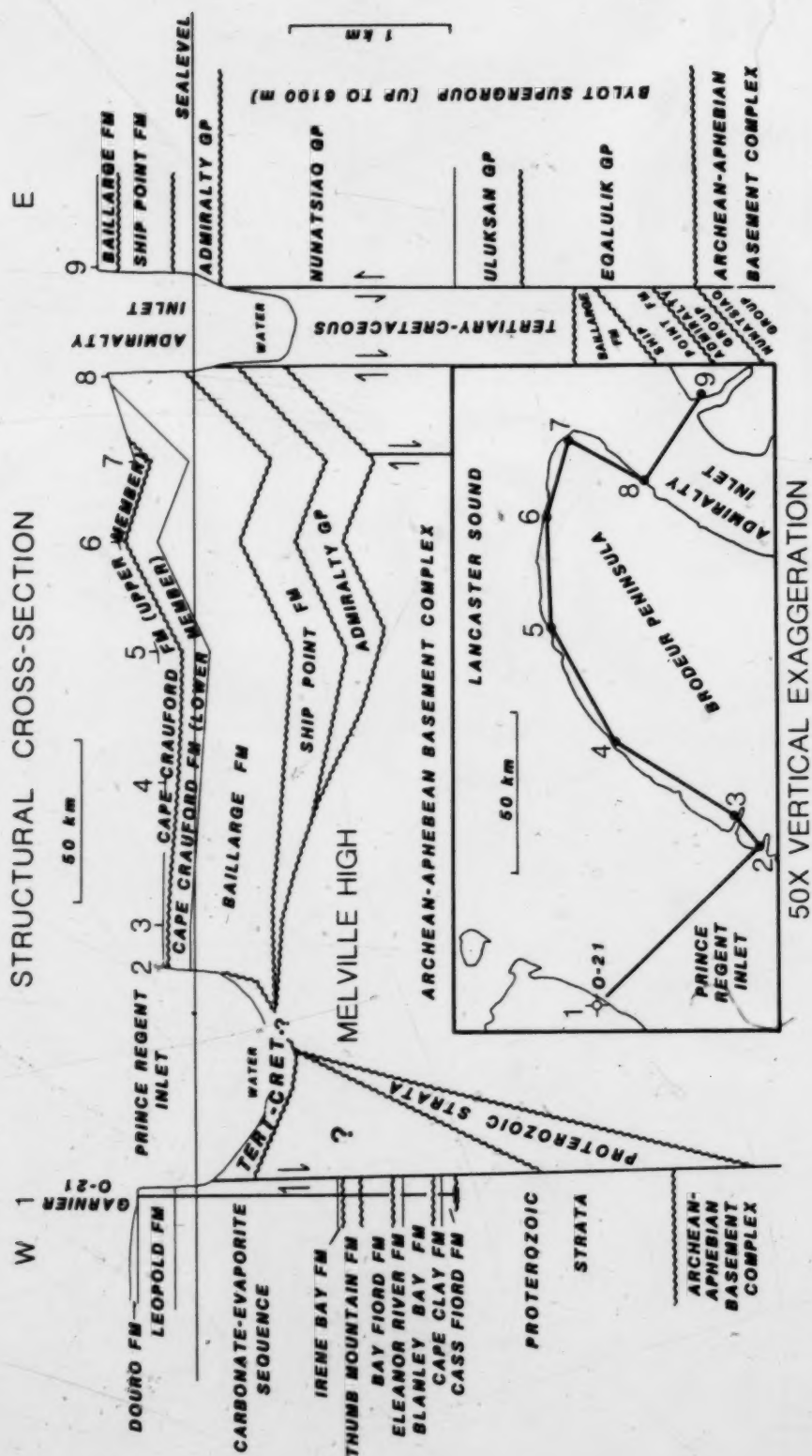


Figure III.8 Schematic structural cross-section, Somerset Island to Borden Peninsula. Subsurface geology except in the Garnier O-21 borehole is loosely constrained by geophysical data (see text).

during the Late Caledonian orogeny in the Siluro-Devonian which was subsequently rejuvenated as a normal fault during the Eureka rifting episode.

Admiralty Inlet

Admiralty Inlet was formed as a graben (named the Admiralty Inlet Trough) at the same time as the Lancaster Aulacogen (Kerr, 1980). Reflection seismic data in Admiralty Inlet led Pflueger (1974) to suggest that the inlet opposite Strathcona Sound (Fig. 1.1) is floored by Paleozoic formations. However, a reflection seismic survey by Lack (1972a) demonstrated a low-velocity section several kilometres thick in the vicinity of Baillarge Bay. This seismic information, the negative gravity anomaly (Fig. III.5) in Admiralty Inlet, and the subsea topography provide ample evidence for a thick Tertiary-Cretaceous sequence in Admiralty Inlet (Fig. III.8). The seismic and bathymetric data of Lack (1972a) showed that those areas underlain by the thickest sections of Tertiary and Cretaceous sediment also corresponded with the deepest water, which in Admiralty Inlet reaches 740 m (Pflueger, 1974).

F. ROLE OF THE MELVILLE HIGH

Tectonic activity of the Melville High from Late Neohelikian to Silurian times, coupled with eustatic changes in sea level controlled depositional environments, the areas of subaerial exposure and indirectly, karst development. For example, the most extensive karst occurs near the axis of the Melville High in the Jackson Inlet-Port Bowen area. The Cape Crauford Formation thickens northeastwardly away from the axis of the Melville High (Figs. III.2 and IV.2). The Ship Point Formation unconformably overlies Archean rocks on the east coast of Brodeur Peninsula about 22 km southwest of Yeoman Island (Fig. 1.1) according to Blackadar (1956). This is probably due to erosion of the underlying Gallery and Turner Cliffs formations associated with uplift of the Melville High prior to deposition of the Ship Point Formation (Fig. III.2) in the Early Ordovician.

IV. ORDOVICIAN-SILURIAN STRATIGRAPHY OF NORTHERN BRODEUR PENINSULA

A. INTRODUCTION

The strata of northern Brodeur Peninsula comprise the Ship Point, Baillarge, and Cape Crauford formations (Fig. IV.1). These formations were correlated throughout the northern part of the peninsula where they are almost flat-lying (Fig. IV.2). One of the most important properties controlling the field appearance of the strata of northern Brodeur Peninsula is colour. Colour values of samples range from 2 to 8 in the Munsell system. Chromas generally range from 1 to 3 and rarely exceed 4. In general, weathered and fresh surface colours are identical. However, comparison of weathered and fresh surface colours for all field units revealed that up to 20% of the units weather lighter and 6% weather darker than their respective fresh surfaces. There are, however, slight variations depending on gross composition (Table IV.1).

B. SHIP POINT FORMATION

Introduction

The Ship Point Formation at its type section on Borden Peninsula (Fig. III.8, locality 9) consists of 280 m of partly silty and sandy dolostone (Lemon and Blackadar, 1963). It was redefined by Trettin (1975) to include the upper sandstone member of the Turner Cliffs Formation (*sensu* Lemon and Blackadar, 1963) or member S3 of the Turner Cliffs Formation (*sensu* Trettin, 1969). Accordingly, this sandstone unit was defined as member A and the original Ship Point Formation was assigned to the new member B. As so defined the formation at its type section is 305 m thick.

Distribution and Thickness

The uppermost 38 m of the Ship Point Formation crops out southwest of Cape Crauford where it was measured in sections M and MX (Figs. IV.2, 3 and H in pocket).

COMPOSITION	PERCENTAGE WEATHERING LIGHTER	PERCENTAGE WEATHERING Darker	NUMBER OF UNITS
Limestone	20	6	108
Dolomitic Limestone	16	3	94
Calcareous Dolostone	12	6	65
Dolostone	18	4	134

Table IV.1 Percentage of field units in the Brodeur Group and Ship Point Formation weathering lighter or darker than their respective fresh surfaces. Data are grouped according to gross composition.

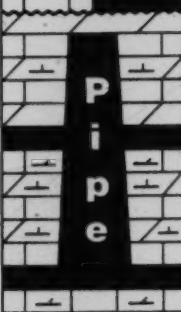
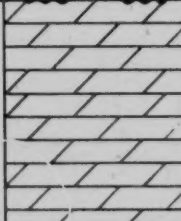
GROUP	FORMATION	GROSS LITHOLOGY	SUMMARY DESCRIPTION
BRODEUR 796-874 m	CAPE CRAUFORD 282-360 m		upper member, unit b, 42 m interbedded limestone (in part breccia), dolomitic limestone, calcareous dolostone, and dolostone
			upper member, unit a, 110 m limestone (in part breccia) is overlain by massive fine to medium crystalline dolostone
			lower member, 130-208 m interbedded limestone (in part breccia), dolomitic limestone, calcareous dolostone, and dolostone
	BAILLARGE 514 m		member B, 374 m massive dolomitic limestone, minor limestone (in part breccia)
			member A, 140 m dolostone interbedded with limestone (in part breccia)
	SHIP POINT		dolostone, massive, fine to medium crystalline

Figure IV.1 Composite lithostratigraphic column of measured strata. Breccia bodies are shown in black.

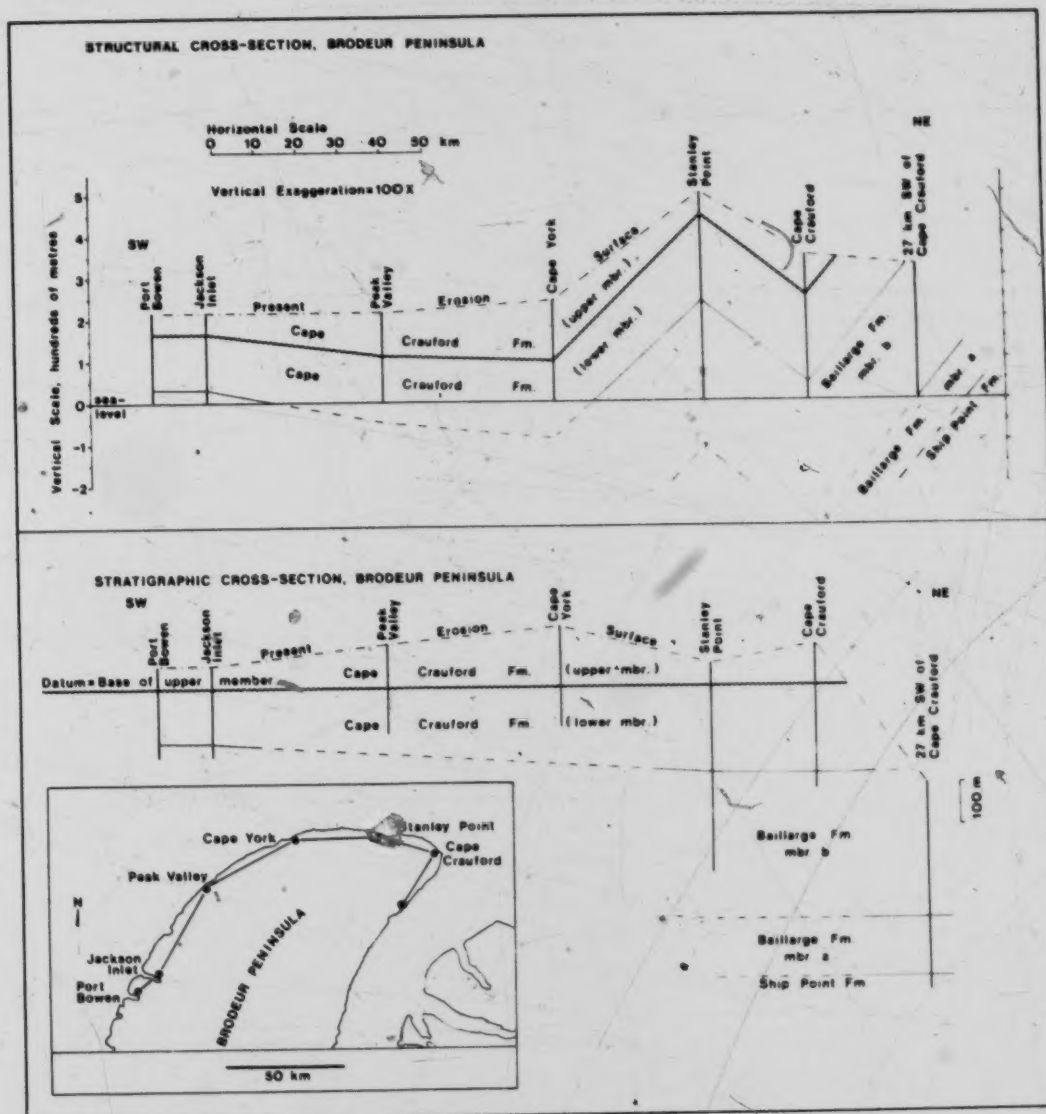


Figure IV.2 Structural and stratigraphic sections, northern Brodeur Peninsula

Lithology

The formation consists of very well indurated, mainly medium to thick bedded mottled dolostone. The upper 7 m of the formation (units MX2 to 6 of Fig. H in pocket) also contains some planar to irregularly laminated and planar bedded units in addition to mottled dolostone. The fine to coarse crystalline dolostone is estimated to have 10 to 15 percent porosity along stylolites, fractures, and between crystals. Rare fossils include chain corals, gastropods, nautiloids, ossicles and ostracods.

Depositional Environment

In this and other sections dealing with depositional environments, all aspects of the strata, including fossils are considered. Special emphasis is placed on determination of paleosalinity. The most pronounced effect of hypersalinity, according to Raup and Stanley (1978) is lowered species diversity, but there are many other factors such as temperature, clarity, oxygen content and depth of water as well as substrate conditions, food availability etc. that affect fossil content. Further, according to Raup and Stanley (1978, p. 261),

The few species that live in most brackish and hypersaline environments usually are present in great abundance because of reduced interspecific competition for ecologic niches.

A high diversity of in situ phyla and generally high fossil content is therefore good evidence for normal marine salinities whereas low diversity but high fossil content of well-known euryhaline phyla such as gastropods and ostracods may provide evidence for wider ranging brackish or hypersaline conditions.

Only 38 m of the Ship Point Formation was examined in this study so that information pertaining to depositional environments is necessarily limited. Fossils include rare chain corals, a high-spired gastropod, an orthoconic nautiloid, rare ostracods, and conodonts. According to work cited in Tasch (1973), most paleozoic rugose and tabulate corals are inferred to have lived in well-oxygenated, agitated and generally circulating seawater. Further, they were restricted to the photic zone in warm waters (at least 16°C) less than 50 m deep and required a substrate relatively free of silt accumulation (*in Tasch, 1973*). The assumption that

is made, of course, is that these were hermatypic corals, which today are restricted to water depths less than 100 m (Raup and Stanley, 1978). Modern corals are restricted to waters of near normal marine salinity (Flügel, 1982). Paleozoic corals were probably similarly restricted. Pervasive dolomitization in the Ship Point Formation has obliterated most of the original textures such that original rock types cannot be used as evidence for interpretation of depositional environments. However, the mottled (bioturbated), medium to thick-bedded nature without cross-stratification or intraclasts suggests relatively quiet water conditions such as might be present below normal wave base. The depth of normal wave base, however, varies from about 10 m for carbonate platforms, according to Flügel (1982) to about 50 m for carbonate ramps (Thorsteinsson and Mayr, 1987). In the Canadian Arctic Archipelago, Cambrian and Lower Ordovician sediments were deposited on a carbonate ramp whereas Lower and Middle Ordovician (Arenigian to lower Caradocian) sediments were deposited on a restricted platform with a rimmed margin (Mayr, 1985). The Ship Point Formation may have been deposited at about the time of shelf transition from a ramp to a rimmed basin. Following these arguments, a water depth of about 10-100 m seems reasonable for the Ship Point Formation.

Age

Conodonts recovered from the top of the Ship Point Formation in the present study were assigned to the Early Ordovician (early to middle Canadian) (G. Nowlan, written comm., 1986; appendix 5).

Regional Distribution and Correlation

This formation crops out elsewhere on Baffin Island along the east coast of Brodeur Peninsula and on Borden Peninsula, where it is formed of dolostone with subsidiary sandy dolostone, dolomitic intraformational conglomerate and minor dolomitic quartz sandstone, siltstone and shale (Trettin, 1969). On eastern Brodeur Peninsula 75 km southwest of Cape Crauford the formation is between 152 and 213 m thick (*in* Miall and Harding, 1971). It

becomes more argillaceous and silty southward such that on southern Brodeur and Borden Peninsula the lower part contains sandy dolostone, dolomitic quartzose sandstone and intraformational conglomerate (Trettin, 1969).

On northern Borden Peninsula the Ship Point Formation is anomalously thin (Trettin, 1969). For example, it is only 46 m thick near the head of Elwin Inlet, Borden Peninsula (Fig. 1.1), and only 103 m thick in Foxe Basin (Trettin, 1969, 1975).

On Somerset Island the interval 1596.5-1845.9 m in the Garnier O-21 borehole (Fig. 1.1, borehole 9, Fig. V.2 and J in pocket) was originally assigned to the Ship Point Formation by Mayr (1978). Later, this interval was reassigned by Mayr *et al.* (1980) to the Eleanor River Formation (1596.5 to 1658.9 m), together with a unit referred to as 'unpamed carbonates' (1596.5 to 1845.9 m). This latter interval, which contains evaporites was referred to as the Blangley Bay Formation by Okulitch *et al.* (1986). On southern Devon Island between Maxwell Bay and Burnett Inlet (Fig. 1.1), it consists of partly argillaceous limestone with minor dolostone and shale (Christie, 1977; in Miall and Harding, 1971). In most areas it disconformably overlies the Cambrian Turner Cliffs Formation (Trettin, 1975).

C. BAILLARGE FORMATION

Introduction

The type section of the Baillarge Formation (originally named the Baillarge Bay Formation) was described by Lemon (1956) in cliff exposures on the north side of Baillarge Bay, Borden Peninsula (Fig. 1.1, locality 9 and Fig. III.8). It was renamed the Baillarge Formation by Lemon and Blackadar (1963) to conform with recommendations of the American Commission on Stratigraphic Nomenclature. Only the lowermost 116 m of the Baillarge Formation were measured by Lemon (1956) though the formation exceeded 140 m in thickness (Lemon and Blackadar, 1963). It was described as a mainly thick-bedded to massive greyish-blue slightly dolomitic limestone with dolomitic patches (Lemon and Blackadar, 1963). A 9 m thick gypsum unit was reported by Lemon in the interval 99.1 to 108.2 m above

the base of the formation (Fig. 2 in Blackadar, 1956). Later, however, neither Lemon (1956, p. 254) nor Lemon and Blackadar (1963) make any mention of evaporites in this interval. According to Lemon and Blackadar (1963, p. 71) the Baillarge Formation from 99.1 to 108.2 m above the base contained "...large masses of coarse-grained calcite, mainly as scree, presumably derived from vein and solution pipe infillings." R. G. Blackadar (written comm., 1986) now believes that gypsum was not encountered in the Baillarge Formation at this locality.

The Baillarge Formation was extended up to the first significant and mappable change in lithology by Trettin (1965a, b) who established its composite reference section about 25 km southwest of Cape Crauford (Fig. III.8, locality 8) and informally divided it into A and B members.

Member A of the Baillarge Formation

Distribution and Thickness

Member A of the Baillarge Formation is 140 m thick and was measured in sections MX, N, and P (Figs. IV.2, 3 and H in pocket). The contact with the underlying Ship Point Formation is covered at the reference section.

Lithology

The basal 60 m of member A is covered and overlain primarily by dolostone with some interstratified limestone and rare thin beds of shaley limestone. Based on thickness, the exposed part of member A consists of dolostone (44%), calcareous dolostone (25%), limestone (12%), dolomitic limestone (7%), argillaceous limestone (6%), cherty limestone breccia (4%) and argillaceous dolostone (2%). These compositional zones are interbedded as units which are generally between 2 and 10 m thick (Fig. H in pocket). Rare and poorly preserved-gastropods, disarticulated brachiopods, stromatolites and ossicles are present in the dolostone. Of 23 samples collected from member A, major rock types include dolostone (26%), microsparite (17.4%), and lesser proportions of other rock types (Table IV.2). Stratal thicknesses are variable, ranging from planar laminated to extremely thick bedded. Dolomitic mottling, while

ROCK TYPES		Mbr. A, Baillarge Fm.	Mbr. B, Baillarge Fm.	Lower Mbr., Cape Crauford Fm.	Unit A, Upper Mbr., Cape Crauford Fm.	Unit B, Upper Mbr., Cape Crauford Fm.
LIMESTONE	Intrasparite	8.7	0.7	3.0	0.0	6.3
	Intramicrosparite	8.7	0.0	2.0	0.0	0.0
	Coated Grain Sparite	0.0	0.0	0.7	0.0	0.0
	Coated Grain Microsparite	0.0	0.0	0.7	0.0	0.0
	Biosparite	0.0	0.0	1.7	0.0	6.3
	Biomicrosparite	4.3	33.3	4.3	1.8	6.3
	Biopelsparite	0.0	3.5	1.7	0.0	0.0
	Biopelmicrosparite	0.0	5.7	3.0	0.0	6.3
	Pelsparite	0.0	1.4	5.7	3.6	6.3
	Pelmicrosparite	4.3	1.4	6.7	0.0	0.0
	Intraclast-Bearing Microsparite	0.0	0.0	0.0	0.0	0.0
	Coated Grain-Bearing Microsparite	0.0	0.0	0.0	0.0	0.0
	Fossiliferous Microsparite	0.0	2.8	1.0	0.0	0.0
	Peloidal Microsparite	0.0	0.0	0.0	0.0	0.0
	Microsparite	17.4	4.3	12.0	5.4	0.0
	Sparite	0.0	1.4	5.0	1.8	6.3
	Detrital Calcilutite	0.0	0.7	1.7	0.0	0.0
	Detrital Calcarene	0.0	0.7	1.7	0.0	0.0
DOLOSTONE	Intraclastic Dolostone	0.0	0.7	3.0	0.0	0.0
	Coated Grain Dolostone	0.0	0.7	1.7	0.0	0.0
	Biogenic Dolostone	4.3	18.4	6.7	30.4	18.8
	Peloidal Dolostone	0.0	0.7	0.3	0.0	0.0
	Dolostone	26.0	10.6	14.0	46.4	37.5
	Detrital Dololutite	8.7	1.4	1.7	1.8	0.0
	Detrital Dolarenite	8.7	0.0	1.0	1.8	0.0
	Breccia	8.7	9.9	20.7	7.1	6.3
	Quartzose Siltstone	0.0	1.4	0.0	0.0	0.0
	Total Number of Samples	23	141	299	56	16

Table IV.2 Percentage of rock types based on occurrence of samples taken from the Brodeur Group, Brodeur Peninsula.

present is not nearly as prevalent as in the overlying member B of the Baillarge Formation. There are three natural divisions in member A at the reference section that are defined by the presence of a concordant breccia bed about 83 m above the base of the member.

Member A Below the Concordant Breccia

Member A below the concordant breccia comprises argillaceous limestone interstratified with variously dolomitic carbonates. Structures include mottles, planar strata and cross-strata. In unit N10 columnar stromatolites up to 40 mm wide and 70 mm high occur many of which have grown on rounded elongate intraclasts (Plate XII.11B). The intraclastic zone in units N11 to 14 is about 4 m thick and occurs immediately below a 3 m thick cherty carbonate breccia. In unit N11 some of the intraclasts, which range to 65 mm long are themselves composed of intraclasts (Plate XII.12B). Unit MX11, only 1.5 m below the MX16 breccia (Plate XII.16A,B) contains elongate intraclasts truncated by a planar erosion surface (Plate XII.11C). However, whether this erosion was subaerial or submarine is not clear.

Fossils below the stratified breccia of member A include ossicles, ostracod and thin-valved brachiopod fragments, gastropods, ostracods and conodonts. Of 8 conodont samples simple cones and compound elements were obtained from 6 and 4 samples respectively.

Member A Above The Concordant Breccia

Above the concordant breccia member A consists of dolostone and dolomitic limestone though it is overlain by a 3 m thick slightly dolomitic and fossiliferous limestone in section MX. The uppermost 35 m of member A differs in that it is mainly a medium to thick bedded mottled dolostone. Sedimentary structures include relict high-amplitude stylolites and rare oscillatory ripple marks (15 cm wavelength and 1 cm amplitude in unit P9). Ostracods, ossicles, rare gastropods and conodonts (including compound elements) were obtained from above the stratified breccia.

Depositional Environments

A restricted platform with a rimmed margin was present northwest of Brodeur Peninsula at the time of deposition of member A of the Baillarge Formation (Mayr, 1985). Wave base in

such a setting was probably not much deeper than for unrimmed carbonate platforms, which according to Flügel (1982) is about 10 m. An overall shallowing-up sequence from subtidal to intertidal is suggested in the interval from 10 to 30 m in section N (Figs. IV.3 and H in pocket) for numerous reasons. These include an upward increase in intraclast content and cross-strata combined with an upward decrease in dolomitic mottles. Some of the intraclasts contain ooids or are themselves composed of intraclasts. At present, most marine ooids are formed in the tropics and subtropics in waters less than 15 m deep and influenced by wave action or tidal currents (Flügel, 1982). A diverse fossil assemblage, including echinoderm ossicles, ostracods, brachiopods, gastropods and conodonts in the interval 91-97 m in section MX suggests normal marine salinities. However, gastropods and ostracods are well known as tolerant to a wide range of salinities and the ossicles could be transported. The presence of gastropods and ostracods in section P may suggest somewhat restricted conditions above the concordant breccia of member A of the Baillarge Formation. Collectively, the data suggest shallowing-up subtidal conditions in the interval below the concordant breccia. The generally low fossil content is consistent with slightly restricted conditions though there may be other paleoecological controls. The interval above the concordant breccia is commonly mottled (bioturbated) and ostracods, gastropods and echinoderm ossicles dominate. Extensive dolomitization excludes the use of rock types in interpretation of depositional environments. However, its medium to thick bedded nature, without the presence of intraclasts or cross-stratification suggest quiet water conditions such as would be present on the sea-floor below normal wave base and perhaps below storm wave base.

Age

Although fossils were not collected from member A, a late Middle Ordovician age was assigned based on ages derived from overlying and underlying units and the assumption that members A and B were conformable (*in* Trettin, 1969). Conodonts obtained from 9 of the 11 samples collected in the present study, however were assigned a Canadian to earliest Whiterockian age (G. Nowlan, written comm., 1986; appendix 5).

Regional Distribution and Correlation

According to Trettin (1965b) member A of the Baillarge Formation thickens southward to several hundred feet near Agu Bay, southern Brodeur Peninsula (Fig. 1.1). Member A is a shale, siltstone and dolostone lithofacies that thins eastward and grades to slightly argillaceous limestone east of Brodeur Peninsula (Trettin, 1975). Member A, if it occurs at all at the type section, is contained in the 30.5 m covered interval at the base of the formation. Member A was not recognised at Inuktorfik Lake (just east of Quartz Lake, Fig. 1.1) or to the southeast in Foxe Basin (Trettin, 1975). Map unit Ols, which was introduced by Trettin (1975) in Foxe Basin differs from the Baillarge Formation in that member A is absent and it is limited to the Ordovician.

Member A of the Baillarge Formation has been identified in parts of Borden Peninsula and along eastern Brodeur Peninsula by its distinctive dark talus and recessive nature (Trettin, 1969). It was originally correlated by Trettin (1969) with what is now called the Bay Fiord Formation. The base of the Bay Fiord Formation, however, is not known to be diachronous or older than Whiterockian elsewhere in the Canadian Arctic, which suggests that member A is not lithostratigraphically correlative with the Bay Fiord Formation. In addition, there is a major unconformity between members A and B of the Baillarge Formation in which most of the Middle Ordovician is missing.

In fact, member A at the reference section is lithologically more similar to the Ship Point Formation than it is to member B of the Baillarge Formation and will probably be reassigned to the Ship Point Formation pending further field work. Because there are already two informal members (A and B) in the Ship Point Formation (Trettin, 1975) a new member C would be the most logical choice. The only unfortunate consequence of such a reassignment would be that member B of the Baillarge Formation would become equivalent in rank to the Baillarge Formation and would therefore be rendered obsolete. This problem is of little consequence, however, because Member A has never been positively identified at the type section of the Baillarge Formation nor in Foxe Basin.

Member B of the Baillarge Formation

Distribution and Thickness

Member B is mainly confined to the northeastern part of the map area between Sargent Point and the reference section, 25 km southwest of Cape Crauford (Fig. I.3, IV.2, 3, 7 and H in pocket). It is 356 m thick at section L where almost all of the member is exposed. Elsewhere it is less well exposed because of the regional northwest dip of the strata (Fig. I.3, III.8, IV.2). Thus, the member is either partly below sea level or is mostly covered by talus at the base of cliffs. The upper half of member B is well exposed in the northern coastal cliffs between Sargent Point and Stanley Point. It is less well exposed in the interior of the peninsula except along the Tukungajug, Saaningajug and other unnamed rivers (Figs. I.2, 3). The only sections measured in the interior are those by Yorath and High-Wo about 25 km south of Cape York. It is clear from the description of sub-section 61-IV-G-3 by Yorath and High-Wo (*in de Wit and Sproule, 1962*) that the uppermost 134 m of member B of the Baillarge Formation is represented by their interval 936-1375' (285.3-419.1 m). Fossils collected from this interval were examined at the Paleontological Collections at the University of Alberta. Sproule and Associates Ltd. identified *Favosites* sp., *Heliolites* sp., *Encrinurus* sp., pentamerid and indeterminate brachiopods, ?*Pentamerus*, *Orthoceras* sp., and *Hormotoma* sp. The *Encrinurus* has been reassigned to *Frammia arctica* by B. D. E. Chatterton (written comm., 1987). Because this species is restricted to the Ludlovian and the specimen occurs in a lithology atypical of member B of the Baillarge Formation, it is concluded that this sample represents scree material.

Prominent zones up to 50 m thick in the upper part of the member are traceable in cliff photographs without any pronounced change in thickness for up to 40 km between Sargent Point and Stanley Point. Although the formational contact between the Baillarge and Cape Crauford formations is visible only 2 km northeast of section L, it is truncated by the present erosion surface at section L such that the uppermost 27 m of member B is missing. This thickness of missing strata was established by correlating the prominent and recessive intervals of sections I, J & K (Fig. G in pocket) with those of section L (Fig. H in pocket).

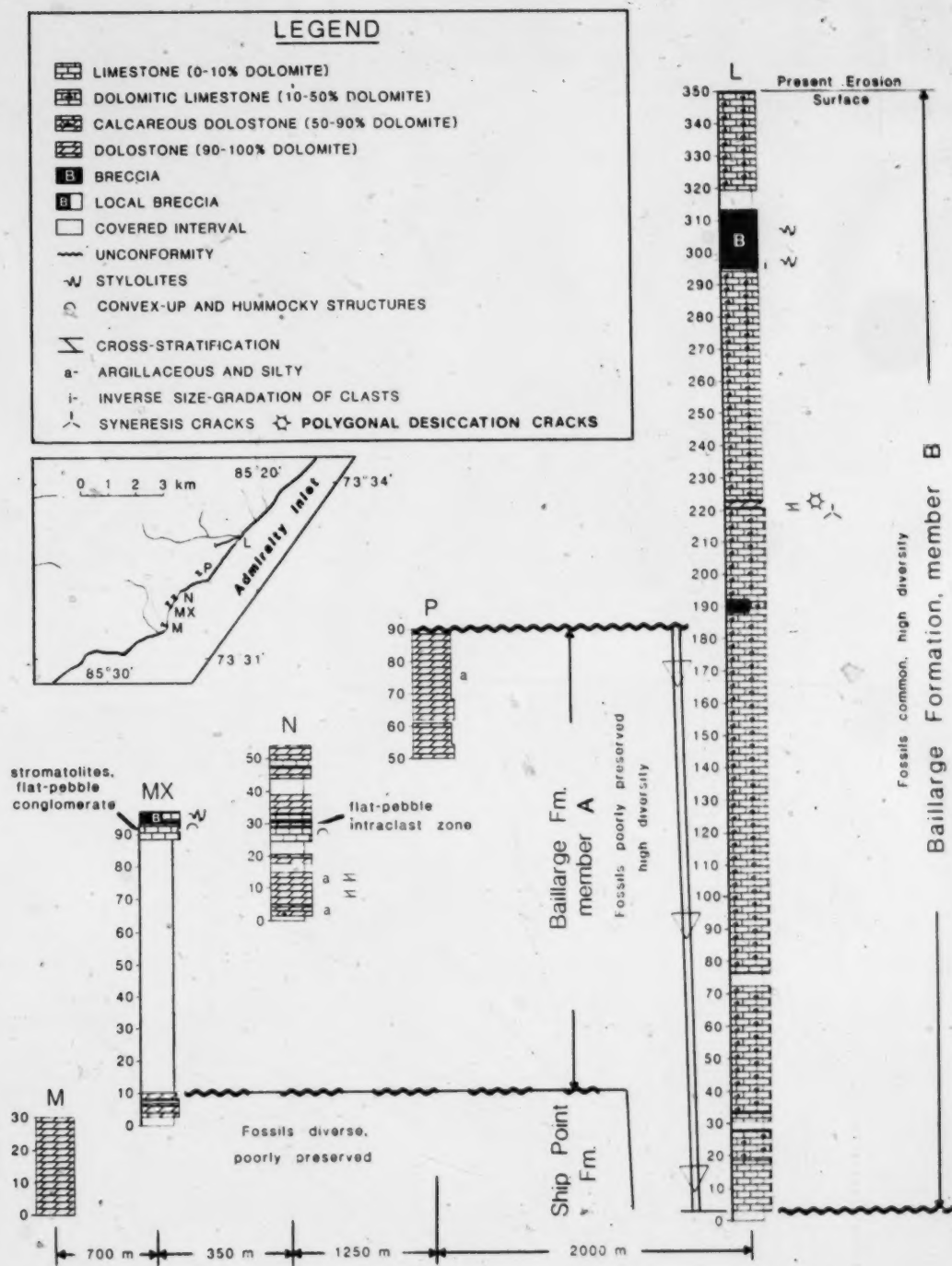


Figure IV.3 Summary of the composite reference section of the Baillarge Formation measured 25 km southwest of Cape Crauford, Brodeur Peninsula.

In this fashion unit K5, which is overlain by recessive strata is correlated with the top of unit L8. The L12 breccia together with the overlying covered unit L13 correlates almost exactly with the J3 and 4 covered interval. Furthermore, a small-scale discordant breccia a few metres above the base of unit L14 correlates with a zone of high-amplitude stylolites at a similar height above the base of L5. While stromatoporoids are common in units L5 (basal 30 m) and L14, they are absent in the upper 45 m of units L10 and J2, consistent with the correlation derived above.

Lithology

Member B of the Baillarge Formation is the most prominent unit on northern Brodeur Peninsula (Plates XII.1A,C, 2B, 3A). The lower 217 m of the member is a very homogeneous fossiliferous mottled dolomitic limestone. According to Folk's (1969) extension of the Munsell Colour Classification, member B is typically a weak medium olive-brown limestone with weak very light yellowish-orange dolomitic mottles. The homogeneous nature of the dolomitic mottling is the most distinctive property of member B, though dolomitic mottling is also present elsewhere in the Brodeur Group.

The dolomitic zones vary from thin discontinuous wisps along stylolites to 'well-developed' regularly-shaped mottles to 2 cm in size. In general, the wisps and mottles are elongate parallel to bedding. Meander and branching patterns occur on bedding planes, attesting to their biological origin. The mottles undoubtedly represent diagenetic alteration of burrows that may originally have been only a few millimetres in diameter. The origin of dolomitic mottling on Somerset Island has been discussed by Jones *et al.* (1979) where this rock type has been referred to as rubbly limestone. The homogeneous sequence of mottled dolomitic limestone is broken by a small-scale discordant (local) breccia 186 m above the base of member B, 30 m below an exposure surface defined by polygonal desiccation cracks (unit L9, Fig. H in pocket).

Fossils in the lower 217 m of member B are diverse and average 20% in 26 samples. Averages for fossils in these samples include, in decreasing order of abundance, 6% dasyclad algae, 5% ossicles, 4% ostracods, 2% corals, 1% brachiopods, 0.6% orthocones, and rare

gastropods, bryozoans and stromatoporoids. The brachiopods are generally small and comprise less than 1% of the rock over most of this interval. Only a few metres below the subaerial exposure surface that is assumed to mark the Ordovician-Silurian boundary up to 20% pentamerid brachiopods to 40 mm in size become common. The interval from 217.5 to 219 m above the base of member B comprises planar and ripple laminated ostracodal very fine crystalline dolostone. Overlying this (219-220 m above the base of member B) is a quartzose siltstone containing symmetrical ripple marks with superimposed synaeresis cracks, low-angle cross-laminae and polygonal mudcracks. Fossils in unit L9 are restricted to disarticulated leperditid ostracods (to 1 cm in size) but these comprise up to 25% of the rock. The basal contact of the planar laminated dolostone of unit L9 with the underlying mottled dolomitic limestone is transitional over 10 cm and polygonal desiccation cracks occur only 2 m above mottled dolomitic limestone.

The overlying interval, from 220 to 347 m above the base of member B is a homogeneous mottled dolomitic limestone similar to the basal 217 m of member B but differs in that thick-shelled pentamerid brachiopods (to 45 mm in size) are the dominant fossils. They occur in 'lenses' in which brachiopods comprise up to 50% of the rock. Another significant difference is that the dasyclad algae so common in the lowermost 217 m are absent from 220 to 347 m above the base of member B. Other fossils include corals, ostracods, stromatoporoids, ossicles, gastropods and orthoconic nautiloids. Of two conodont samples processed from this unit only simple cones were recovered.

The upper 236 m of member B of the Baillarge Formation were also measured near Stanley Point (Plate XII.2B and Figs. I.4, IV.2, 7 and G in pocket). Although almost 40% of this section is covered, the exposed rock is lithologically similar to that at section L. Exceptions include a planar laminated peloidal aphanocrystalline to very fine crystalline dolostone (unit I8) and a planar laminated to thin bedded ossicle-bearing dolostone (unit I6). Fossil content near Stanley Point differs from that at the reference section in that there is a zone of large pentamerid brachiopods (to 50 mm in size) concentrated in a 5 m thick zone 218 m below the top of member B. It also differs in that dasyclad algae, so common at the

reference section, are almost absent at Stanley Point. Of three conodont samples processed from the Stanley Point material, simple cones were recovered from all whereas compound elements were obtained from only one. The upper 65 m of member B of the Baillarge Formation at Cape Crauford is similar to that at section L and at Stanley Point. Dasyclad algae are very rare at Cape Crauford, at Stanley Point and in the Silurian part of member B of the Baillarge Formation at the reference section.

At Jackson Inlet and Port Bowen rocks of member B have been pervasively dolomitized to a fine to medium crystalline dolostone (Figs. A to D in pocket). Member B also contains a higher proportion of planar lamination, planar bedding, cross-stratification and intraclasts than elsewhere on northeastern Brodeur Peninsula. Fossil content and diversity is similar and dasyclads are absent. The basal contact with member A of the Baillarge Formation is unconformable (Figs. IV.1, 3, V.1) because conodont-derived ages suggest that most of the Middle Ordovician (Marmor to Barneveld inclusive) is missing (G. Nowlan, written comm., 1986 and appendix 5). Biomicrosparites, biopelmicrosparites and biosparites comprise 43% of the samples collected from member B. Dolomitized equivalents of these (18.4%) are most common in the Jackson Inlet-Port Bowen area (Table IV.2).

Depositional Environments

In the Canadian Arctic Archipelago during the Middle and Upper Ordovician, according to Mayr (1985, p. A38) "Uniform, subtidal deposition took place on a well circulated platform. The platform edge was a steep slope without deposition." A depth for normal wave base of about 10 m is therefore appropriate for this setting by analogy with the modern Bahama carbonate platform (Flügel, 1982). The lower 217 m of member B of the Baillarge Formation is interpreted, on the basis of diverse and high fossil content, lithology, stratal character and thickness to have been deposited below normal wave base on a shallow carbonate platform in seawater of normal or near normal marine salinity. Studies of modern carbonate sediments in the Bahamas by Hardie and Ginsburg (1977, p. 90) have shown that

The bulk of the sediment accumulating at present on the tidal flats, is subtidal bioturbated peloidal aragonite mud up to 2 m thick with no internal layering. Churning, burrowing, browsing, and pelleting by marine invertebrates are constant activities that ensure that no fine layering will survive below mean tide level.

A similar situation is envisaged for the lower 217 m of member B of the Baillarge Formation. The presence of dasyclad algae and corals suggests deposition in the photic zone probably in 30 m of water or less (Flügel, 1982). Rapid shallowing to supratidal conditions is recorded in the interval from 217.5 to 220 m. Shallow, hypersaline conditions may confidently be interpreted by the presence of synaeresis cracks and abundant leperditid ostracods. The quartzose siltstone in this interval contrasts with the carbonates of the rest of the Brodeur Group and may be wind-blown because no sand-sized quartz was observed. The interval from 217.5 to 220 m above the base of member B may, therefore, record the eustatic sea level drop associated with the well-known glaciation at the end of the Ordovician (Berry and Boucot, 1973). The interval from 127 to 134 m below the top of the Baillarge Formation in the section measured by Yorath and High-Wo (*in de Wit and Sproule, 1962*) is limestone pebble conglomerate, an occurrence of some interest because it may record the same shallowing event as evidenced by desiccation cracks 154 m below the top of the formation in section L at the reference section (Fig. H in pocket). The interval from 220 to 347 m is similar to the lower 217.5 m of member B of the Baillarge Formation. It represents deposition below normal wave base but in the photic zone. A possible exception to this near the upper contact is exemplified at Port Bowen by rare large algal heads complete with rippled calcarenite between them (Plate XII.10F).

Age

The basal 3.25 m of member B was assigned a Late Ordovician (Edenian to mid-Maysvillian) age on the basis of conodonts obtained from the present study (G. Nowlan, written comm., 1986; appendix 5). Earlier, the basal 87 m of member B were assigned a late Middle to early Late Ordovician age (*in Trettin, 1969*). Conodonts in the interval 106 to 139 m above the base of member B were considered Richmondian or possibly Late Maysvillian by Barnes (1973) and Barnes (*in Trettin, 1975, p. 89-91*). The interval from 185 to 189 m above the base was assigned to the Richmondian-Gamachian on the basis of conodonts (G. Nowlan, written comm., 1986 and appendix 5). From 195 to 295 m above the base of the member there are numerous brachiopods including *Rhipidium* (Bolton, *in Trettin, 1969*) which were

subsequently reassigned to the middle Llandoveryan genus *Virgiana* by Berry and Boucot (1970). Silurian fossils occur from 191 to 349 m above the base of member B according to Bolton (*in* Trettin, 1969). It is difficult to directly compare previously determined intervals with those of the present study because of inaccuracies in measuring sections. Conodonts from the interval 220 to 224.3 m above the base of member B were tentatively assigned to the Silurian based on the morphology of ramiform elements questionably assigned to *Ozarkodina* (G. Nowlan, written comm., 1986; appendix 5). Conodont ages therefore bracket the Ordovician-Silurian boundary to the interval 185-224.3 m above the base of member B (B. Chatterton, The University of Alberta, oral comm., 1987). It seems probable, therefore that the Ordovician-Silurian boundary coincides with the desiccation cracks 220 metres above the base of member B, because this may reflect the drop in sealevel at the end of the Ordovician described earlier. Of 29 conodont samples processed from member B for the present study 24 and 16 yielded simple cones and compound elements respectively.

The fossils collected from the upper 134 m of member B of the Baillarge Formation in the interior of the peninsula by Yorath and High-Wo (*in* de Wit and Sproule, 1962) were assigned a Silurian age by Sproule and Associates Ltd.

Regional Correlation

The interval from 87 to 106 m above the base of member B of the Baillarge Formation was tentatively correlated lithostratigraphically with the Irene Bay Formation (Trettin, 1975). The difficulty of picking the equivalent of the Irene Bay Formation is a result of a marked decrease in clay content away from the Franklinian eugeosyncline. Member B of the Baillarge Formation only locally weathers recessively with a distinct bluish-grey colour (Plate XII.1A). Member B is Late Ordovician in age (G. Nowlan, written comm., 1986; appendix 5) and is therefore about the same age as the Irene Bay Formation in other parts of the Arctic Archipelago. On southern Devon Island the Irene Bay Formation is 160 m thick and consists of interbedded gypsum, limestone and shale (Christie, 1977). On Grinnell Peninsula, northwestern Devon Island, the contact with the overlying Thumb Mountain Formation is conformable and consists of gypsum/anhydrite overlain by a green argillaceous and dolomitic

mudstone (Morrow and Kerr, 1977). Conodonts from the base of the formation were assigned a late Whiterockian to Porterfieldian age (Barnes, 1973). All or part of member B of the Baillarge Formation is considered to be correlative with map unit Ols in Foxe Basin (Trettin, 1975). It is similarly correlated with the Thumb Mountain Formation on Devon and Somerset islands (Fig. V.1).

D. CAPE CRAUFORD FORMATION

Introduction

The Cape Crauford Formation was defined by Trettin (1965b, p. 18) to include "...all lower Paleozoic strata of northwestern Baffin Island overlying the Baillarge Formation." The type section is situated between 2.4 km south and 3.2 km northwest of Cape Crauford, northern Brodeur Peninsula where the informal members A, B and C were delineated (Trettin, 1965b). Members A and B are lithologically similar and difficult to distinguish outside the type locality. Consequently, they are herein grouped together and termed the lower member. Member C of Trettin (1965b) is here referred to as the upper member.

Lower Member of the Cape Crauford Formation

Introduction

At the type locality (Plate XII.2A) the lower member consists of interbedded or intergraded variously dolomitic carbonates. As a general rule, dolostone, breccia and mottled dolomitic limestone weather more prominently than limestone. The varying amounts of non-carbonate material gives the unit a distinctive striped appearance from a distance. It is readily apparent that Dr. Neill (*in* Parry, 1826, p. 91) was describing the lower member of the Cape Crauford Formation when he noted that several strata varying in colour from grey to black "...alternate with each other in long undulated streaks several hundred feet in length, varying in thickness from that of a line to several feet, and containing many bivalve shells, lepidites, &c."

Distribution and Thickness

With the exception of section L, the lower member of the Cape Crauford Formation is present in all sections (Figs. I.3 and IV.2). In addition to coastal exposures it crops out in river valleys in the interior of the peninsula (Fig. I.2). The lower member is 202 m thick at Cape Crauford, 208 m thick at Stanley Point, but only 135 m thick at Port Bowen. The contact with the underlying Baillarge Formation is placed at the base of the first interstratified calcareous dolostone and microcrystalline limestone, as proposed by Trettin (1965b). At Stanley Point the basal contact is abrupt and conformable. At Jackson Inlet on the other hand the Baillarge Formation is massive dolostone or interbedded limestone and dolostone, but can be distinguished from the Cape Crauford Formation on the basis of its uniform thick bedded and mottled character.

Lithology

Composition

Taken as a whole, on the basis of thickness, sections measured in the lower member include covered intervals (29%), carbonate solution breccia (27%), limestone (18%), dolomitic limestone (13%), calcareous dolostone (6%) and dolostone (7%) and see Table IV.3. These general 'compositional zones' may include several consecutively stacked field units (e.g., units A1 to 8 all belong to the limestone compositional zone). This results from the division of field units, which was made on criteria other than general composition e.g., colour, sedimentary structures and weathering character. Thicknesses for each 'compositional zone' in the lower member of the Cape Crauford Formation are shown in the histograms of Fig. IV.4. Most of the dolostone and calcareous dolostone zones are less than 3 m thick and almost all are less than 10 m thick. By contrast, carbonate solution breccia, limestone, calcareous dolostone and covered intervals have a wider ranging distribution. While most of these are thinner than 4 m a significant number are thicker than 10 m. In contrast with member B of the Baillarge Formation, there is a much higher diversity of rock types in the lower member of the Cape Crauford Formation. The upper 35 m of the lower member at Cape Crauford (Fig. IV.6 and E in pocket) is a complex interbedded succession comprising breccia, stylolitic limestone, limestone containing hummocky and convex-up structures, and variously dolomitic pisolitic

PERCENTAGE OF GROSS COMPOSITIONAL ROCK TYPES IN SECTIONS A-R										
LITHOLOGY	A	B	C	D DX TL	E G	H	J	R	MEAN %	
limestone	22	23	26	12	12	15	28	8	18	
dolomitic limestone	3	2	27	15	20	1	14	18	13	
calcareous dolostone	12	2	7	2	9	0	6	0	6	
dolostone	4	11	10	18	5	0	7	3	7	
carbonate solution breccia	37	59	20	20	24	20	20	20	27	
covered interval	22	3	10	33	30	64	25	51	29	

Table IV.3 Percentages of gross compositional rock types (based on thickness) in the lower member of the Cape Crauford Formation, Brodeur Peninsula.

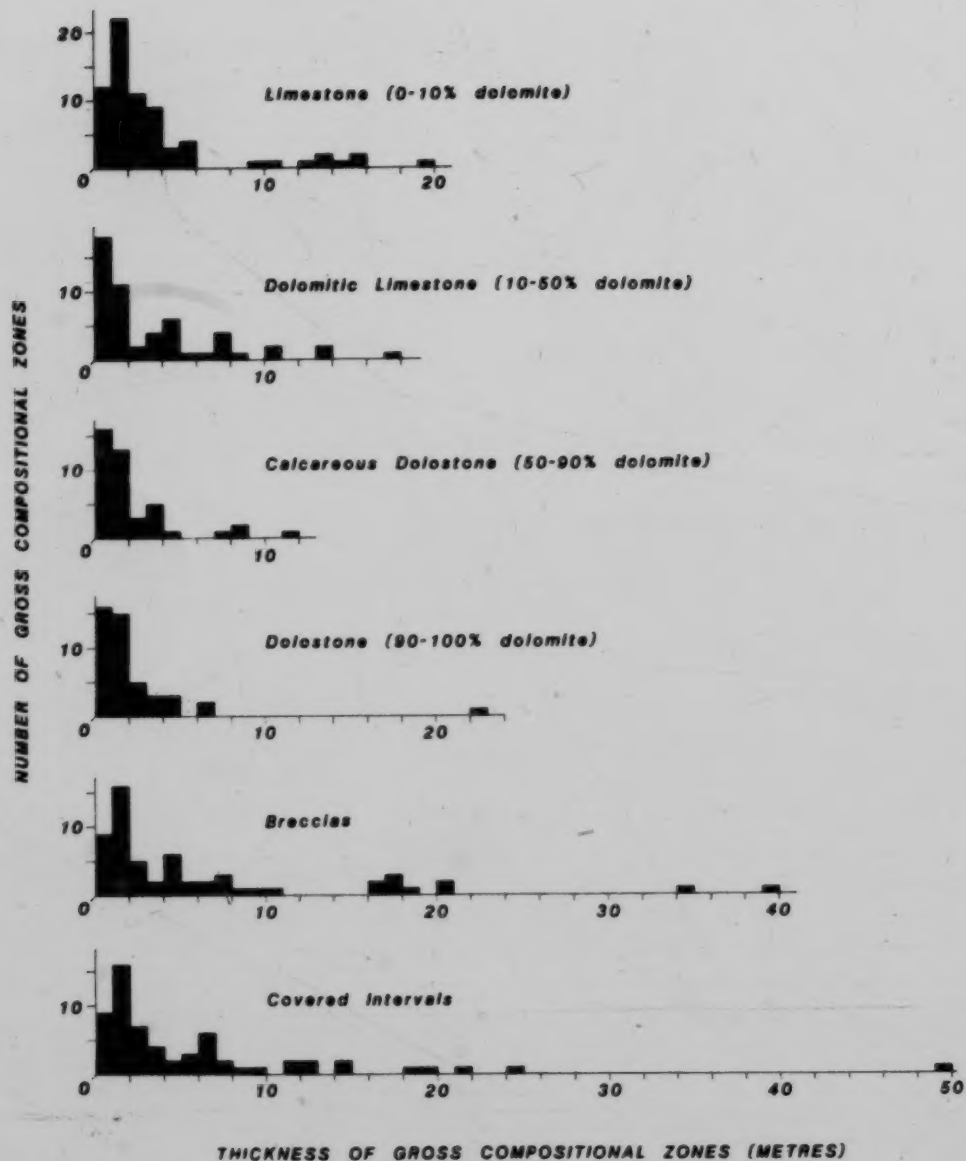


Figure IV.4 Histograms showing thicknesses of gross compositional zones in the lower member of the Cape Crauford Formation, Brodeur Peninsula.

limestone (Fig. IV.7). Of 27 categories of rock types only four are not represented (Table IV.2).

Colour

The main pigment is probably organic matter though finely disseminated iron-rich minerals in various oxidation states are also present. Colour value (relative black to white) of the dolomitic carbonates are generally lighter than calcareous carbonates (Fig. IV.5). The hue of rock samples from the lower member is very close to 10YR which in Folk's (1969) terminology is weak olive-brown for dark rocks and weak very light yellowish-orange for the light rocks. Since hue is essentially constant it is ignored in the relation between colour and composition. Only rock samples of a single homogeneous colour were chosen in the determination of colour value. The results (Fig. IV.5) show that the carbonates range from very dark to extremely light according to the colour classification of Folk (1969). Although dolostones are generally lighter than limestones, however, there is a considerable variation in each of the limestone, dolomitic limestone, calcareous dolostone, and dolostone categories. Limestones, for example, range from very dark to very light, dolomitic limestones and calcareous dolostones from very dark to extremely light and dolostones span the dark to extremely light range. Average values are 5.5 for limestones (between medium and light), 5.2 for dolomitic limestones, 6.3 for calcareous dolostones (between light and very light) and 6.1 for dolostones. The dolomitic rocks are therefore about one point lighter in value on average than the calcareous rocks. A striking colour contrast is present in the dolomitic mottled limestones in which the dolomitic mottles are always lighter than the surrounding limestone. This is not related to bioturbation because dolomite is also lighter in colour along and near stylolites as well. Another example of local bleaching associated with dolomitization is evident where dolomitization has occurred only on one side of a subvertical fracture (Plate XII.13B). However, these effects are of local importance only. Some thick dolostone zones are commonly darker than overlying or underlying units, regardless of gross composition. The retention of colour, despite dolomitization has also been reported by Rhodes *et al.* (1984) in the Pine Point area.

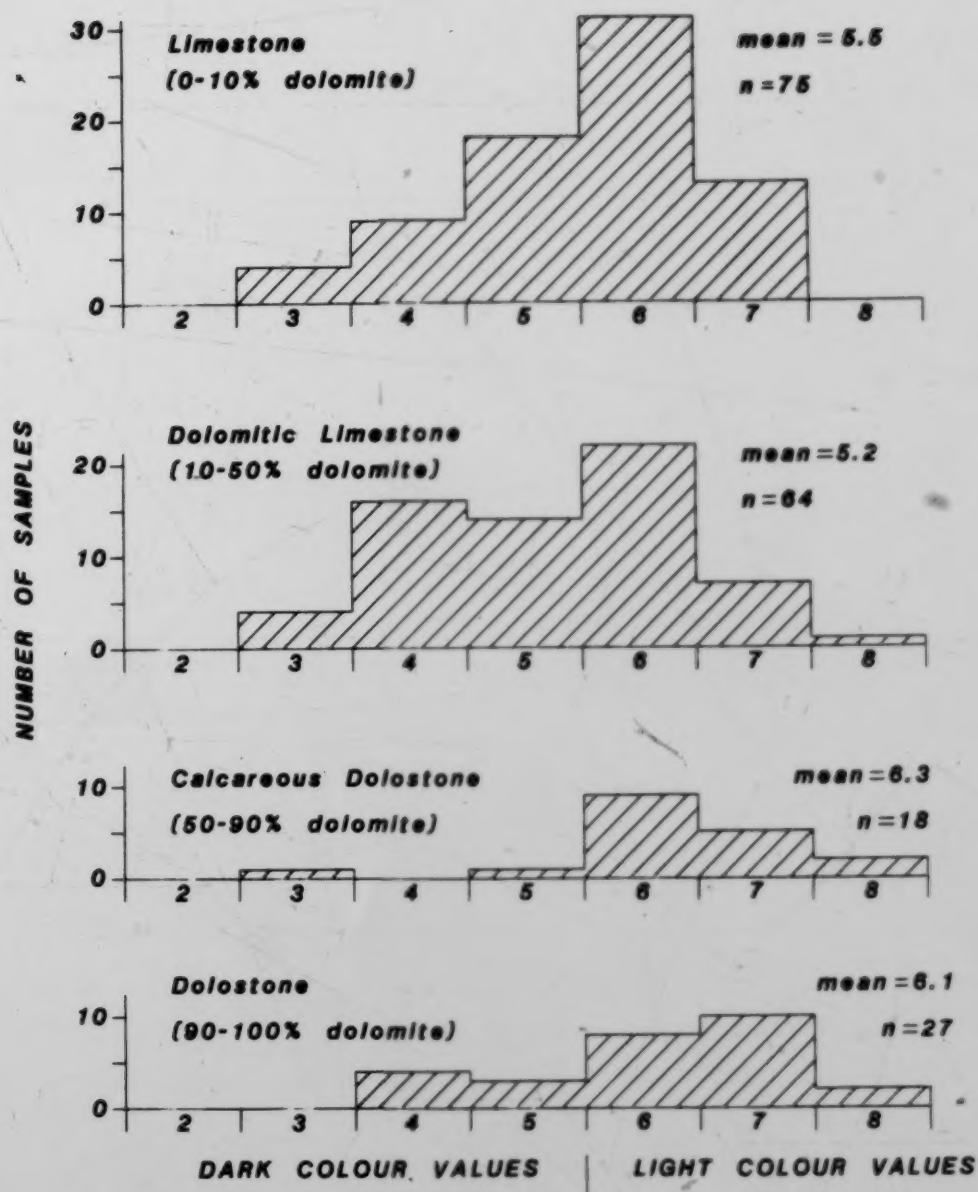


Figure IV.5 Fresh surface colour values for carbonate rock samples from the lower member of the Cape Crauford Formation, Brodeur Peninsula.

The lower member of the Cape Crauford Formation has a distinctive 'striped' appearance, especially in the upper part. Individual dark and light units may be followed for many kilometres without noticeable change. When sections are measured only a few kilometres apart, however, there is no corresponding relation and limestones in one section may be dolostones in another. This suggests that the colour is an original effect that persisted in spite of dolomitization. Bleaching associated with dolomitization as described earlier is probably of local importance unless dolomitization has been pervasive.

Contacts Between Field Units

Of a total of 319 field unit contacts described from the lower member, 36% were covered, 48% were abrupt and 15% were transitional (mainly in the range from 5 to 20 cm). If it can be assumed that the ratio of transitional to abrupt contacts is representative for the covered contacts as well (as seems reasonable) then 32% of all the contacts are transitional.

Transitional contacts are evenly distributed throughout the lower member both laterally and vertically and in addition, occur between all manner of lithologies. However, the transitional contacts are in many cases definitely diagenetic (as in the case of the transition from non-breccia to breccia). The difficulty of differentiating between diagenetic and depositional transitional contacts, therefore greatly limits their usefulness. Sabkha cycles contain erosional contacts and these were observed by Reinson (1978) on Somerset Island. The absence of erosional contacts in the Brodeur Group is an important piece of evidence against the presence of former bedded evaporites on Brodeur Peninsula.

Sedimentary Structures

The rocks of the lower member of the Cape Crauford Formation are end products of their depositional environment and diagenesis. Separating these is not easy in the Brodeur Group or for that matter carbonates in general. For example, wavy, hummocky and convex-up structures were originally interpreted as stromatolites in the field. Although stromatolites also occur in these rocks, most of the undulatory structures are clearly diagenetic. Similarly, gypsum crystal moulds were originally interpreted by Trettin (1969) as penecontemporaneous and were taken as evidence of sabkha deposition. However, gypsum pseudomorphs and

moulds occur in all the rock types including fossiliferous limestone (Table IV.4) and the evidence now suggests that they are diagenetic. In Table IV.4 the presence of fossils or sedimentary structures are shown as a percentage of the total number of field units for that class. For example, if gastropods were observed in 10 out of 200 dark limestone units, the occurrence is given as 5%. One of the most perplexing problems is the timing of different episodes of dolomitization and their relation to brecciation.

Another problem which may never be solved is the recognition of original fine grained detrital carbonate. This rock type is undoubtedly underestimated because its original presence can only be inferred by scouring and cross-stratification. It is precisely this kind of rock with high porosity and permeability that would be the most susceptible to dolomitization. One way of approaching the problem is to compare gross composition with sedimentary structures and fossils; this was done for all field units in the lower member of the Cape Crauford Formation (Table IV.4). Each of the rock types was arbitrarily divided into light coloured (values 6, 7 and 8) and dark coloured (values 3, 4 and 5) classes. For comparison purposes the number of occurrences of a structure or fossil of a certain composition is converted to a percentage for that compositional class.

It is reasonable to assume that laterally persistent lamination without scouring, bioturbation or cross-stratification forms in stable, uniform depositional environments. The percentage of this structure is almost identical for light limestones and light dolostones (23 and 27% respectively) and for dark limestones and dark dolostones (46 and 47% respectively). By contrast, these structures occur with about the same incidence for light and dark dolomitic limestones (39 and 41% respectively). Planar lamination in breccia clasts is anomalously low (15%). The size of breccia clasts is undoubtedly related to stratal thicknesses prior to brecciation. For example, a 1 m thick well indurated dolostone bed might produce a crackle breccia in which the upper and lower clast boundaries were original bed boundaries. The clasts would therefore have a size of at least 1 m. Numerous cases occur where thin bedded strata grade laterally to breccia in which individual clasts are the same size as the adjacent unbrecciated beds. With the exception of dark dolostones, almost identical values occur for

STRUCTURES AND FOSSILS		PERCENTAGE OCCURRENCE								
		Limestone		Dolomitic Limestone		Calcareous Dolomite		Dolomite		Breccia
		Light	Dark	Light	Dark	Light	Dark	Light	Dark	
MAINLY PRIMARY SEDIMENTARY STRUCTURES	Planar & Slightly Wavy/Irregular Lamination	23	48	39	41	39	11	27	47	18
	Very Thin & Thin Bedded (1-10 cm)	21	42	38	39	39	11	27	27	8
	Medium & Thick Bedded (10-100 cm)	17	9	17	12	21	33	23	27	1
	Mottled Bedding	9	28	17	37	15	44	10	33	13
	Cross-Stratification	8	4	4	5	18	11	7	7	0
	Intraclasts	15	20	38	34	12	11	10	13	1
	Definitive Stromatolites	4	0	4	5	0	0	0	0	0
FOSSILS	Stromatopora	2	2	17	17	3	11	0	13	8
	Solitary Corals	2	7	4	12	0	0	0	7	9
	Colonial Corals	4	4	9	15	9	0	3	13	10
	Brachiopods	13	17	9	32	9	11	10	7	7
	Echinoderm Ossicles	4	13	13	29	15	11	3	27	18
	Bryozoa	9	0	4	5	3	0	0	7	3
	Gastropods	8	7	9	27	3	22	0	7	4
	Ostracods	11	26	17	29	8	22	0	13	13
	Orthoconic Nautiloids	2	6	9	10	12	11	0	13	8
	Undifferentiated Bioclastic Debris	2	7	4	2	8	0	0	0	3
MAINLY SECONDARY SEDIMENTARY STRUCTURES	High-Amplitude Stylolites	43	24	26	7	15	11	7	20	48
	Wavy, Hummocky & Convex-Up Structures (Including Basal Contacts)	51	9	52	17	52	11	47	13	39
	Contorted Stratification	15	8	9	10	8	0	23	27	9
	Chert Beds/Nodules/Clasts	19	15	11	5	12	0	10	7	28
	Coated Grains/Clasts	11	2	0	2	8	0	10	7	6
	Gypsum Crystal Pseudomorphs & Moulds	9	4	13	2	8	0	7	7	10
	Slickensides	11	4	4	7	0	0	3	0	3
	Local Breccia	36	20	28	5	24	11	37	20	
	Vugs (Including Cleft Moulds)	11	11	9	12	24	0	30	33	42
Total Number of Field Units		47	54	23	41	33	5*	30	16	67
Number Of Field Units Without Sample Control		11	21	2	13	9	5	9	1	19
Light coloured rocks include colour values 6, 7 & 8 and dark coloured rocks include colour values 2, 3, 4 & 5 according to the Munsell system.										
* Percentages calculated from these few samples are approximate only.										

Table IV.4 Percentage occurrences of structures and fossils in light and dark coloured field units (fresh surfaces) of various gross compositions, lower member of the Cape Crauford Formation, Brodeur Peninsula.

very thin and thin bedding as for planar lamination. In a general sense, therefore, for unbrecciated lithologies, the occurrence of lamination and very thin to thin bedding (1 to 10 cm) is about the same.

About one tenth to one third of the strata are medium to thick bedded (10 to 100 cm), undoubtedly a result of prolonged relatively uniform periods of deposition. The low (1%) figure in the breccia category is again interpreted to represent the destruction of bedding; original bed boundaries undoubtedly formed the upper and lower surfaces of the incipient breccia clasts.

Mottling is considered to represent burrowing altered by diagenesis and is therefore both a primary and secondary organo-sedimentary structure. As such there is a strong correlation between bioturbation and rock colour, irrespective of dolomite content. Mottling is present in about three times as many dark limestones and dolostones as in their respective light coloured counterparts. It is also about twice as prevalent in the dark dolomitic limestones and calcareous dolostones as in the light limestones and calcareous dolostones. This is probably related to the higher organic content of the dark rocks. The occurrence of cross-stratification is over twice as high in the light coloured calcareous dolostones as in any of the other classes and this may reflect the susceptibility to dolomitization of an originally porous and permeable sediment. Intraclasts occur in almost equal proportions in the light and dark rocks and their incidence is significantly higher in the dolomitic limestone class where they occur in just over one third of the units.

Definitive stromatolites include digitate and branching varieties and high-relief columnar forms with intraclasts between the columns. Definitive stromatolites occur in 5% or less of the units. Surprisingly, they are not present in the dolomitic rocks. It is probable that some of the hummocky and convex-up structures are stromatolites as well, but the majority are diagenetic because they occur below or in breccias and commonly contain high amplitude stylolites. In addition, they may be associated with or grade into contorted stratification. Only 7% of the 597 units compiled for the present study from the strata on Brodeur Peninsula contain hummocky structures alone and only 0.5% contain convex-up structures without any

other associated dissolution structures. Some or all of these may be stromatolites.

Fossils

Stromatoporoids are present in eight times as many of the dolomitic limestones as in limestones but occur in equal proportions in the light and dark units. Twice as many corals are present in dolomitic limestone as in limestone units. They are also more common in the dark dolomitic limestones than in light dolomitic limestones. The incidence of brachiopods is twice as high in dark dolomitic limestone units as in the dark limestone units (32 vs 17%). Bryozoans occur in all the compositional types but are too rare to provide reliable statistical trends. Gastropods are present in about as many light as dark limestone units (6 and 7% respectively) but are three times as abundant in the dark dolomitic limestones. Ostracods are consistently more common in the light than the dark units. With the exception of the dolostone class orthoconic nautiloids occur in about as many light as dark units, a not surprising result for a nektonic organism. Undifferentiated bioclastic debris is present in up to 7% of the field units but there are no trends with respect to colour value. Fossil content and diversity varies both laterally and vertically in the lower member. At the type section fossils in the lower 145 m of the member are common but diversity decreases upwards (Figs. IV.6 and E in pocket). A rare occurrence of disparid(?) crinoids with preserved stems and crowns was observed at Cape Crauford (Plate XII.10E). Rare examples of digitate stromatolites were also encountered (Plate XII.11A). In the remainder of the lower member, from 145 to 202 m above the base, fossils are rare and of low diversity. At Stanley Point they are less common than at Cape Crauford but a similar upward decrease in diversity is apparent. The upper 39 m of the member, which is almost barren of macrofossils, is dominated by convex-up and hummocky structures that resemble stromatolites, but are undoubtedly diagenetic in origin. At Cape York only the upper 90 m of the member is exposed and except for a few ostracods and brachiopods, the section is unfossiliferous (Fig. F in pocket). Similar hummocky and convex-up structures are common in the uppermost 33 m. Fossils collected by Yorath and High-Wo (*in de Wit and Sproule, 1962*) in the interior of the peninsula south of Cape York were examined at The University of Alberta. Sproule and Associates Ltd. identified *Favosites*

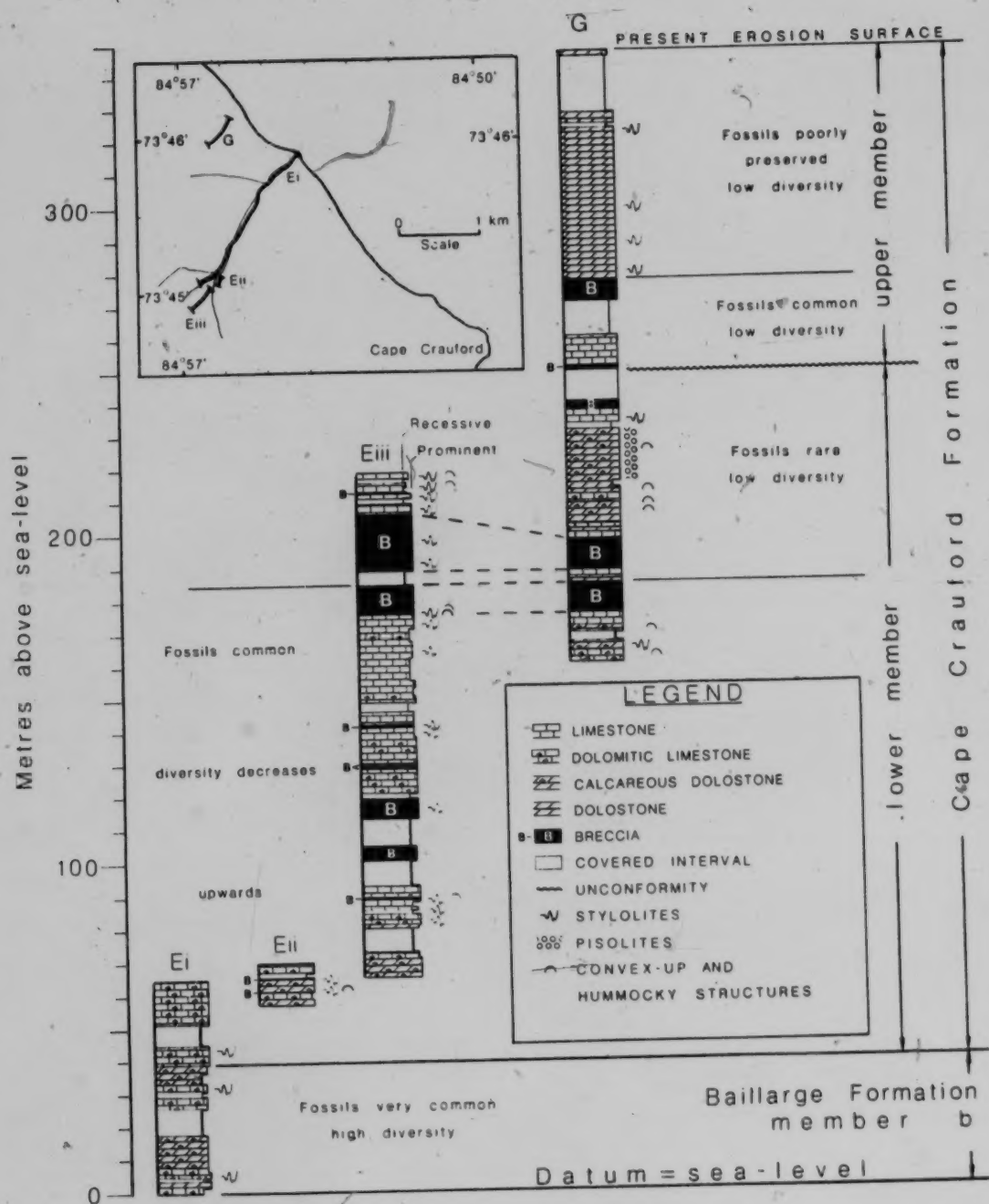


Figure IV.6 Simplified type section of the Cape Crauford Formation with inset showing section localities.

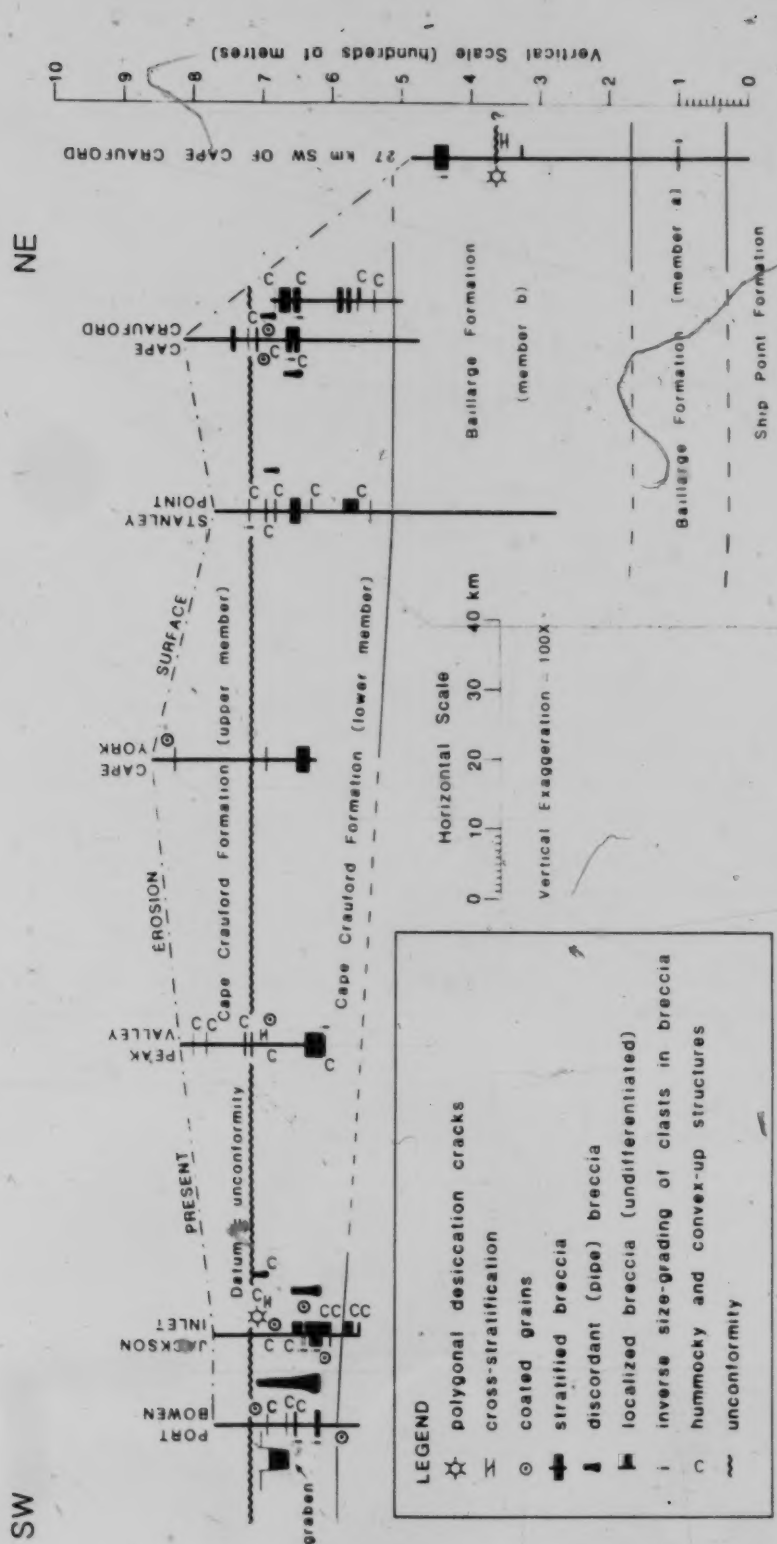


Figure IV.7 Stratigraphic cross-section showing selected geological features.

sp., a stromatoporoid, *Spinatrypa* sp. and a *Pentamerus* sp. At Peak Valley where only the upper 111 m is exposed above sealevel fossils are rare and much of the section is covered (Fig. I in pocket). At Port Bowen and Jackson Inlet (Figs. A to D in pocket) the lower half of the member contains diverse macrofossils comprising ostracods, corals, stromatoporoids, orthocones, gastropods, brachiopods, ossicles and bryozoa. These are less abundant, however than elsewhere. Strata in the upper part of the lower member generally contain a low population, low diversity fauna. At Cape Crauford (Fig. E in pocket), the upper 60 m of the lower member of the Cape Crauford Formation comprises a low diversity fauna of ostracods, ossicles and gastropods.

Depositional Environments

Carbonate platform as opposed to ramp conditions are indicated for the time of deposition of the Cape Crauford Formation because of the abrupt lateral facies change from carbonate to shale on Cornwallis Island at the shelf/slope break (Thorsteinsson and Kerr, 1968). A depth for normal wave base of about 10 m is therefore appropriate by analogy with the modern Bahama platform (Flügel, 1982). The great variety of rock types (Table IV.2), the high incidence of lamination, very thin and thin bedding, cross-stratification and intraclasts (Table IV.4) as well as rare examples of ooids suggests varying depositional conditions such as might occur within the range of normal wave base. Although fossil content decreases upward in the lower member, the diversity of phyla in all rock types, including breccias (see Table IV.4 and Figs. A-I) suggests normal or near-normal marine salinity. The upward decrease in fossil content and diversity is not accompanied by an increase in content of euryhaline fossils which suggests that the fossils are absent for reasons other than hypersalinity. High energy levels within the range of normal wave base is one possibility, though there are numerous others such as food availability, oxygen content, and substrate conditions that could have controlled fossil occurrence. In addition, there is the question of preservation in different environments. This is undoubtedly of importance in high energy environments such as above normal wave-base. The proportion of transitional to abrupt unit contacts must reflect changing depositional conditions; the fact that these contacts are evenly distributed suggests a certain

uniformity of the depositional conditions within the lower member. Intraclastic zones are thin in the lower member and are probably related primarily to storm action. If this is the case, the equal incidence of intraclasts in dark and light rocks suggests that both light and dark strata were deposited in the subtidal zone in the range of normal wavebase. The light coloured rocks may represent shallower subtidal deposits and the darker rocks deeper deposits. Ossicles are present in many more dark units than light units which implies that the dark units were deposited in deeper waters where, presumably, echinoderms were more common.

Age

Fossils collected from the lower member were considered to be Niagaran (Bolton, *in* Trettin, 1969). Although 70 conodont samples were processed from this member for the present study and conodonts were obtained from 39 samples, these proved to be endemic forms.

Nevertheless, a tentative Llandoveryan age was assigned by B. Chatterton, University of Alberta, oral comm., 1986).

Regional Correlation

The lower member of the Cape Crauford Formation is correlated here with unit A of the Allen Bay Formation and with unit A of the Carbonate-Evaporite sequence in the Garnier O-21 borehole (Figs. V.1, 2 and J in pocket). Unit A in the Garnier borehole differs compositionally from the lower member of the Cape Crauford Formation, Brodeur Peninsula, in that it contains more calcareous dolostone (46 vs. 8%), more limestone (40 vs. 25%), less dolomitic limestone (2 vs. 18%) and presumably less carbonate solution breccia (0? vs. 38%). Dolostone content is about the same (12 vs. 10%) and the gypsum (1%) reported in the borehole probably represents cavings. The values given above for Brodeur Peninsula are an average based on all the measured sections through the lower member of the Cape Crauford Formation; they are recalculated to 100% by ignoring covered intervals. If the 38% beccias are similarly ignored and the percentages again recalculated to 100% the differences are even smaller.

Upper Member of the Cape Crauford Formation

Introduction

The upper member, which is informally divided here into units A and B reaches a maximum thickness of 152 m at Cape York (Figs. IV.1, 2 and H in pocket). It is clear that Dr. Neil (in Parry, 1826, p. 92) was describing this distinctive unit when he referred to

...a stratum of a brick-red colour... and hard enough to give sparks with steel; it contains a considerable proportion of siliceous earth, red oxide of iron, and carbonate of magnesia. This stratum always extends to the surface, and is frequently from two to three hundred feet in thickness.

The upper member beds, which extend across collapse zones in the lower member are only rarely downwarped or downfaulted into them (Plate XII.8A,B). In one case in section DX at Port Bowen, upper member beds overlie erosionally truncated and collapsed strata of the lower member (Plate XII.4B). The basal contact of the unit is unconformable in the Port Bowen area because beds of the upper member overlie collapse structures up to 100 m wide (Plate XII.4A). The unconformity is considered to be regional in extent because there is an abrupt lithologic change in the Garnier borehole on Somerset Island as well as on southwestern Devon Island (Fig. V.1). The shallowing-up sequence suggests either a gradual drop in sealevel or regional epeirogenesis.

Upper Member, Unit A

Distribution and Thickness

Unit A, which is 110 m thick, forms the top of the plateau in the western and northern part of the peninsula where it is eroded to various levels. It is distinguished by its orange-weathering colour even where it is poorly exposed in the interior of the peninsula (Figs. I.3 and IV.2).

Lithology

Unit A is a buff to orange-weathering coarse-grained vuggy or mottled dolostone (Figs. IV.1, V.1 and Figs. A, C, D, E, F, G, and I in pocket) characterised by a thick dark brownish-grey limestone bed at its base (Plates XII.1B,C, 2B, 3A,B, 4A, 5A, 8A,B). Breccia, while present (Fig. IV.7 and Table IV.2), is much less common than in the lower member. There are also

rare occurrences of cross-stratification (Plate XII.12A).

With the exception of conodonts, fossils in unit A are generally poorly preserved except in the basal thick limestone bed. Unit A of the upper member has a diverse fossil assemblage that includes brachiopods, ossicles, corals, stromatoporoids, orthoconic nautiloids and ostracods.

Depositional Environments

Unit A of the upper member of the Cape Crauford Formation contains a high diversity of fossils including well-known stenohaline forms (e.g., Figs. A, C, F, G, and I in pocket). The high proportion of thick bedded mottled biogenic dolostones suggests an original rock type similar to member B of the Baillarge Formation. Collectively, the data for this member suggest a subtidal depositional environment in the photic zone but below normal wave base. Warm water of normal or near-normal marine salinity with a depth range of about 10 to 100 m is consistent with the data.

Age

Fossils are poorly preserved because of extensive dolomitization. A specimen of *Porpites* (a solitary coral) was collected, however, at Cape Crauford 3 to 6 m above the base of the upper member (Trettin, 1969). This genus is late Late Llandoveryan to Early Wenlockian in age according to Berry and Boucot (1970). Of 9 conodont samples processed from this unit for the present study, 7 yielded conodonts that were tentatively assigned to the Llandoveryan (B. Chatterton, oral comm., 1985). It is probable, therefore that this unit is late Late Llandoveryan in age.

Regional Correlation

Unit A of the upper member is the most mappable unit on Brodeur Peninsula (Figs. I.3 and IV.2) and is lithostratigraphically correlated with unit B of the carbonate-evaporite sequence in the Garnier O-21 borehole, northeastern Somerset Island (Fig. V.1). It can be correlated with unit B of the Allen Bay Formation on southern Devon Island.

Upper Member, Unit B

Distribution and Thickness

Unit B is absent due to present erosion over most of the peninsula and was described in the present study only at Cape York where it occurs in the interval 100 to 142 m above the base of the upper member (Plate XII.3B, Figs. IV.2, 7 and F in pocket). The basal contact of unit B, which is conformable at Cape York is marked by a 1.2 m thick brecciated cherty limestone bed.

Lithology

Unit B, which is similar in appearance to the lower member of the Cape Crauford Formation, consists of partly brecciated limestone interbedded with variously dolomitic carbonate. Only 16 samples were collected but they compare more favourably with the lower member of the Cape Crauford Formation than with those of other stratigraphic units (Table IV.2).

Fossils in unit B at Cape York include brachiopods, ossicles, stromatoporoids, orthocones and corals. One of two samples processed for conodonts yielded simple cones and compound elements.

Depositional Environments

Unit B of the upper member of the Cape Crauford Formation, which only occurs in section H (Fig. F in pocket) contains a high diversity of fossils, including abundant stenohaline corals. The various lithologies and sedimentary structures, which include cross-stratification and scouring as well as common planar lamination to thin bedding suggests fluctuating depositional environments, perhaps straddling normal wave base. This unit was probably deposited in conditions similar to those of the lower member of the Cape Crauford Formation.

Age

A Silurian age was specified on the basis of conodonts recovered from five samples (B. Chatterton, University of Alberta, oral comm., 1985).

Regional Correlation

Unit B of the upper member of the Cape Crauford Formation is tentatively correlated

lithostratigraphically with unit C on southern Devon Island (Fig. V.1). It is considered here to change lithofacies toward Somerset Island such that at unit C in the Garnier O-21 borehole it is almost pure anhydrite.

V. REGIONAL ORDOVICIAN AND SILURIAN STRATIGRAPHIC RELATIONS

A. INTRODUCTION

A review of the geological and geophysical data (chapter III) suggested different tectonic and sedimentation histories on either side of Prince Regent Inlet (Figs. III.2, 8). Earlier work by Norris (1963), Trettin (1965a, b), and Mayr (1978) suggested that the breccias of Brodeur Peninsula (Figs. IV.1, 3, 6, 7 and V.1) were formed by the dissolution of bedded evaporites that were at a similar stratigraphic level to those on Somerset Island. One aspect of the present study has therefore been to re-evaluate the earlier stratigraphic correlations. The present study of solution breccias on Brodeur Peninsula (Chapters VIII and IX) has established that their formation was by the dissolution of carbonate rather than evaporite. It could be argued that a study of the evaporite-bearing strata is therefore not required. However, the large quantities of nearby Silurian evaporites and the difficulty of distinguishing between carbonate and evaporite solution breccias are sufficient reasons for re-examining the Somerset Island strata. In addition, the Cape Crauford Formation of Brodeur Peninsula has been correlated with evaporite-bearing strata in the Garnier O-21 borehole (borehole 9, Fig. I.1) which provides another good reason for re-examining the earlier correlations. Accordingly, a detailed study of drill cuttings was undertaken for the Garnier O-21 borehole. The descriptions of formations in the borehole are compared with those at their type localities and with other areas (Fig. V.1).

B. BAY FIORD FORMATION

Description at the Type Locality and Other Areas.

The Bay Fiord Formation in the type area of central Ellesmere Island comprises a 640 m thick succession of fine-grained, thin-bedded limestone, mudstone and anhydrite (Miall and Kerr, 1980). On Bjorne Peninsula, Ellesmere Island, the formation, which occurs in the interval 1229 to 1887 m in the Eids M-66 well consists of dolostone interbedded with shale and

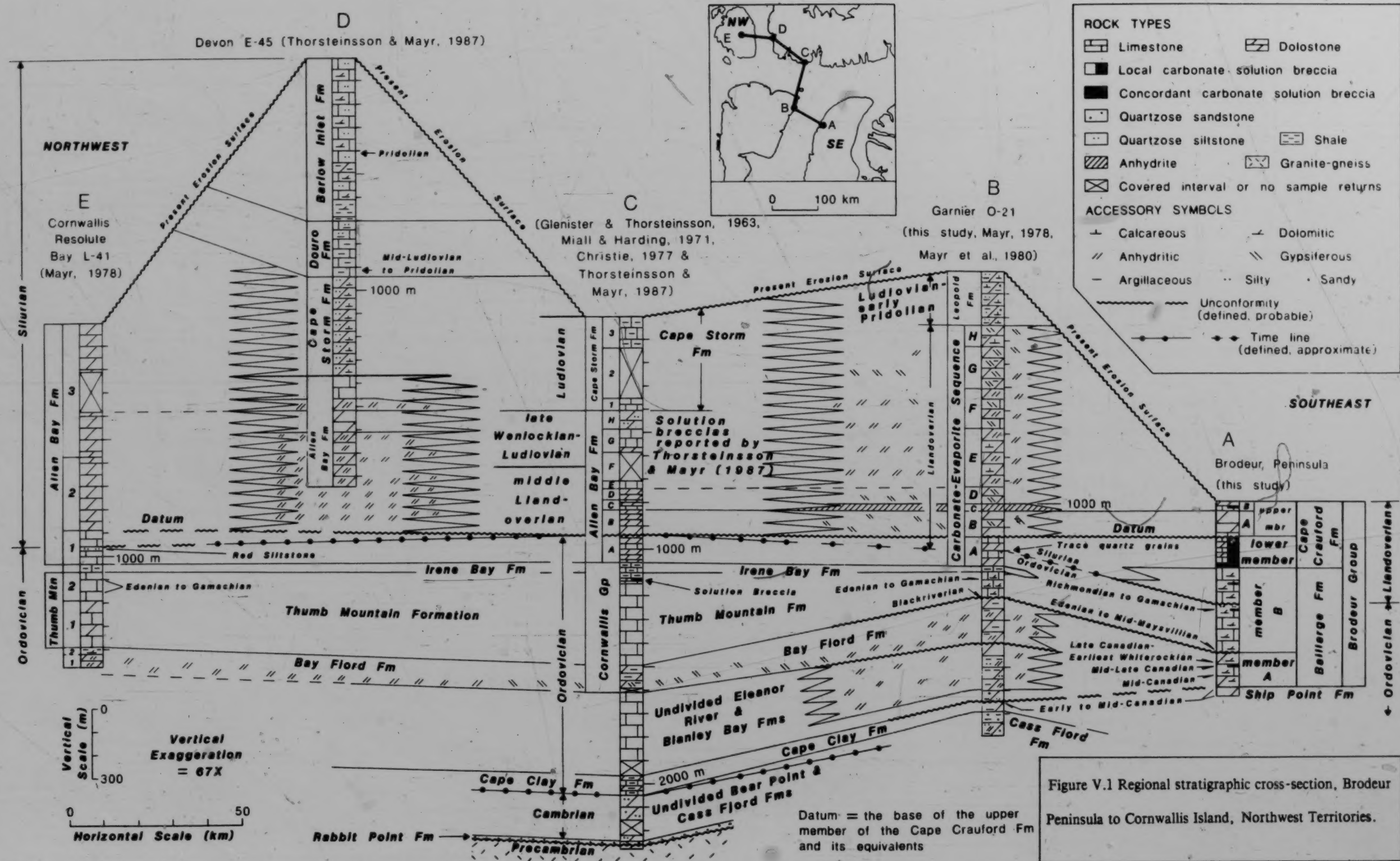


Figure V.1 Regional stratigraphic cross-section, Brodeur Peninsula to Cornwallis Island, Northwest Territories.

anhydrite. An early Middle Ordovician (Whiterockian and Chazyan) age was assigned on the basis of the recovered conodonts (*in Mayr et al.*, 1978).

On Bathurst Island the Bay Fiord Formation was divided into five units containing dolostone, shale, anhydrite, halite and various gradations between. A very shallow to supratidal depositional environment was envisioned by Mayr (1980) and lower Chazyan (mid-Llanvirnian) conodonts were recovered (Barnes, *in Mayr*, 1980).

The Bay Fiord Formation (120 m) near Maxwell Bay, southern Devon Island consists of dolostone (in part silty and argillaceous), and dolostone interbedded with black shale; only the basal 21.6 m contains interbedded gypsum, dolostone and black shale (*in Miall and Harding*, 1971). A white to light grey thinly cross-bedded gypsum unit 9 m thick was reported near the base of the formation (*in Miall and Harding*, 1971). At Burnett Inlet, southern Devon Island (east of Stratton Inlet, Fig. 1.1) the 160 m thick formation consists of interbedded gypsum, limestone and shale (Christie, 1977). On Grinnell Peninsula, northwestern Devon Island, the contact with the overlying Thumb Mountain Formation is conformable and consists of gypsum/anhydrite overlain by green argillaceous and dolomitic mudstone (Morrow and Kerr, 1977). Conodonts from the base of the formation were assigned a late Whiterockian to Porterfieldian age (Barnes, 1973).

On Cornwallis Island the formation (520 m) consists of argillaceous limestone, calcareous and gypsiferous shale, siltstone, gypsum and anhydrite (Thorsteinsson, *in Mayr*, 1978). In the Resolute Bay L-41 well (borehole 6, Fig. 1.1) on Cornwallis Island (from 1420 to 1475 m) it is divided into a lower unit consisting of interbedded dolostone and anhydrite and an upper unit of carbonate and shale (Mayr, 1978).

On Somerset Island the exposed Bay Fiord Formation (43.5 m thick) consists of dark grey or greenish-grey dolostone (Miall and Kerr, 1980). The contact of the Bay Fiord Formation with the overlying Thumb Mountain Formation is disconformable according to Mayr (1978), a relation confirmed for eastern Devon Island by Mayr *et al.* (1980). Conodonts from near the base of the formation near Creswell Bay, southeastern Somerset Island were assigned a late Whiterockian age (*in Miall and Kerr*, 1980). The absence of younger

Porterfieldian or early Wildernessian faunas as reported from the Garnier well, and the relatively thin formation suggested a post-Bay Fiord unconformity to Miall and Kerr (1980); an unconformity considered by Dixon (1978) to be of regional extent. The absence of the Bay Fiord Formation on Foley Island (about 700 km southeast of Cape Crauford) and southeastern Baffin Island may be due to a facies change (assuming the formation is not diachronous) because Wildernessian fossils were recovered there (Trettin, 1975).

Bay Fiord Formation in the Garnier O-21 borehole.

Based on descriptions of drill cuttings undertaken in the present study, the Bay Fiord Formation comprises, in decreasing order of abundance, variously argillaceous dolostone (75%), anhydrite (11%), shale/mudstone (10%), limestone (3%), and lesser amounts of siltstone, calcareous dolostone, gypsum, pyrite and rare ossicles (Appendix 3, Figs. V.2 and J in pocket). The argillaceous very fine to fine crystalline dolostone is marked by a spikey wide-ranging gamma ray curve that suggests a highly variable clay content. In addition, some of the argillaceous dolostone contains anhydrite, quartzose silt and sand. The relatively pure light brown dolostone and light brown to white anhydrite are both very fine to fine crystalline though there are rare transparent anhydrite crystal fragments to 1 mm in size. The nature of the density log and the proportion of anhydrite in the drill cuttings suggest that individual anhydrite beds vary in thickness from a few centimetres to 2 or 3 m. Clay minerals are concentrated in the upper 60 m of the formation and gypsum is in the form of selenite as well as a white crystalline variety. The top of the formation, which was cored from 1400.7 to 1404.8 m is a medium grey, thin-bedded medium crystalline dolostone that also contains disrupted lamination and rare stylolites (Mayr, 1978, p. 44). It is marked by high-amplitude fluctuations over short 1-2 m distances in the density, gamma ray and sonic logs and to a lesser extent the deep induction log (Fig. J in pocket).

The overall dolostone-anhydrite-shale sequence, the mixed nature of individual rock types, and the unfossiliferous character all suggest an intertidal to supratidal depositional environment.

PANARCTIC DEMINEX GARNIER O-21

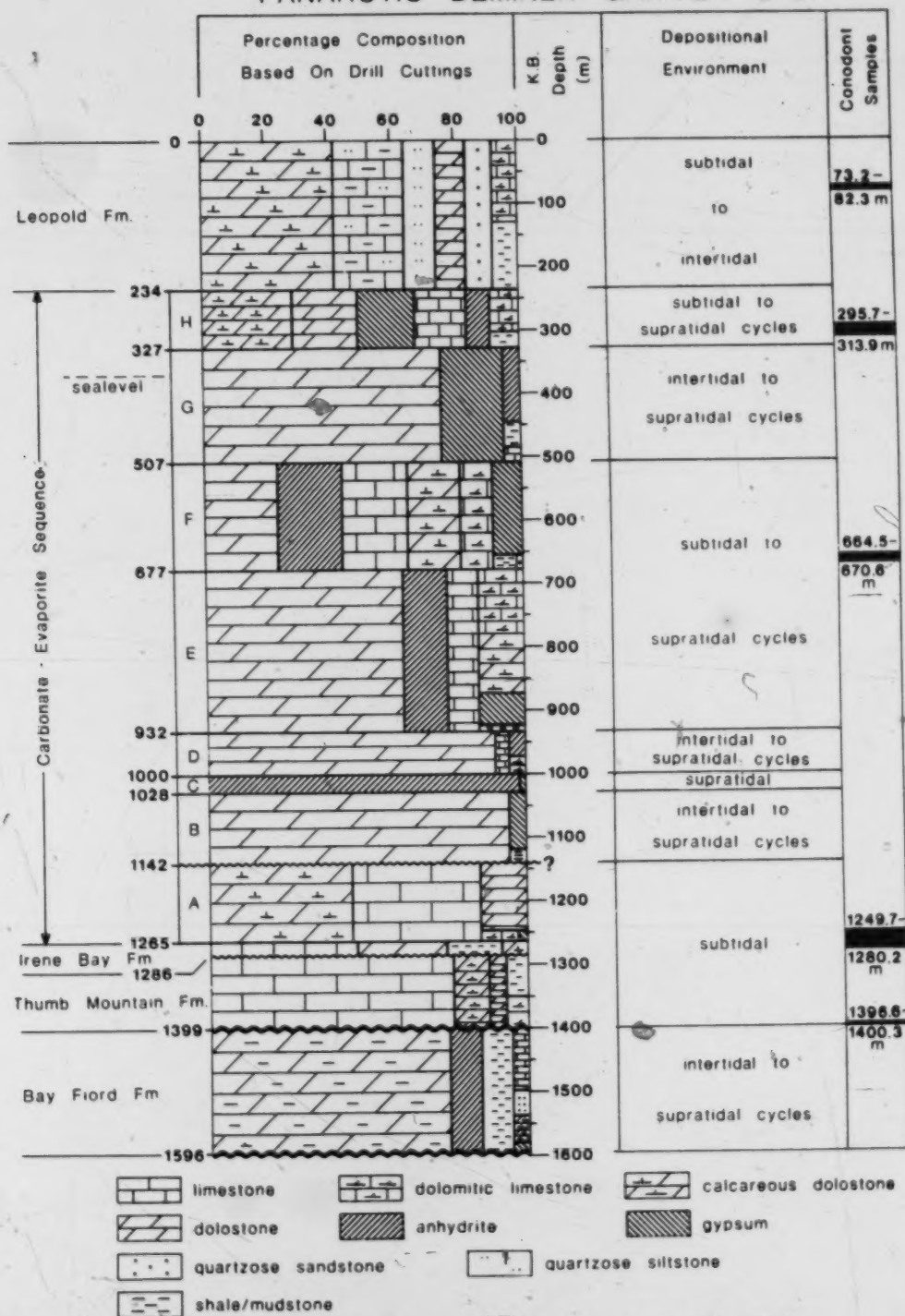


Figure V.2 Geological summary of the Panarctic Deminex Garnier O-21 borehole, northeastern Somerset Island. The carbonate-evaporite sequence is divided informally on the basis of lithology into units A to H.

C. THUMB MOUNTAIN FORMATION

Description at the Type Locality and Other Areas

The Thumb Mountain Formation is up to 760 m thick in the type area on central and eastern Ellesmere Island where it consists of thick-bedded argillaceous and dolomitic limestone (Kerr, 1967a, b). On southern Ellesmere Island the formation is a 300 m thick mottled dolomitic limestone succession (Mayr, 1982).

In the subsurface of Bathurst Island the Thumb Mountain Formation is 254 to 297 m thick and was divided by Mayr (1980) into a lower variably dolomitic limestone and an overlying mottled dolomitic limestone (partly argillaceous and silty). A Barneveldian to Early Maysvillian age for the formation was established by Barnes (1973) on Bathurst Island. On northwestern Devon Island corals taken in the uppermost part of the formation were assigned a Richmondian age (Norford, *in* Morrow and Kerr, 1977). On southern Devon Island between Radstock Bay and Maxwell Bay the Thumb Mountain Formation is 393 m thick according to Miall and Harding (1971) though more recently Thorsteinsson and Mayr (1987) specify a maximum thickness of only 140 m on the west side of Maxwell Bay. It is apparent from their descriptions that the Thumb Mountain Formation and member B of the Baillarge Formation on Brodeur Peninsula are very similar lithologically. On Somerset Island the Thumb Mountain Formation in outcrop is up to 97 m thick and consists of fossiliferous dolomitic limestone and calcareous dolostone. It is absent at Aston Bay where the Allen Bay Formation unconformably overlies the Bay Fiord Formation (Miall and Kerr, 1980). Conodonts were assigned a Late Ordovician age (*in* Miall and Kerr, 1980).

On Cornwallis Island the formation is well exposed and about 300 m thick (Thorsteinsson, *in* Mayr, 1978). Strata lithostratigraphically correlative with the lower 200 m of the Thumb Mountain Formation in the Cornwallis Resolute Bay L-41 borehole are absent in the Garnier O-21 borehole (Mayr, 1978).

Thumb Mountain Formation in the Garnier O-21 Borehole

Descriptions of drill cutting samples from the Garnier borehole (Appendix 3) show that taken as a whole the Thumb Mountain Formation consists mainly of fossiliferous limestone with subsidiary calcareous dolostone, dolostone, shale/mudstone, dolomitic limestone and siltstone (Figs. V.2 and J in pocket).

The fossiliferous limestone (77%) is a soft light grey microsparite to fine crystalline sparite that is partly argillaceous, silty, rarely sandy and stylolitic. Fossils include ossicles, finely costate brachiopods and smooth ostracods. Calcareous dolostone (11%) is most common in the upper 6 m of the formation below the overlying Irene Bay Formation where it is light brownish-grey and very fine to fine crystalline. Present in minor amounts are light greenish-grey, sparry shale and mudstone (4%), dolomitic limestone (2%) and siltstone (<1%). The basal 4 m of the formation in core #2 in the Garnier O-21 borehole was described by Mayr (1978) as a mottled dolomitic fine crystalline limestone containing rare brachiopods and thin beds of skeletal wackestone. Thin laminae of dark grey to black shale were also reported in this interval (Anonymous, 1971). Brachiopods in the upper part of the Thumb Mountain Formation (1319.8-1322.8 m) were dated as Late Ordovician (late Caradocian to Ashgillian) by B.S. Norford (*in* Mayr, 1978). The relatively featureless geophysical log response suggests that the formation is compositionally homogeneous and probably similar to member B of the Baillarge Formation on Brodeur Peninsula. However, the Baillarge Formation does not contain as much argillaceous material or thin bioclastic beds.

D. IRENE BAY FORMATION

Description at the Type Locality and Other Areas

The Irene Bay Formation is a thin transgressive shale that is one of the most areally extensive marker beds in the Franklinian miogeosyncline. It was named and described by Kerr (1967a) near Irene Bay on Ellesmere Island where 83 m of argillaceous limestone with thin green shale beds were described. On southwestern Ellesmere Island in the Eids M-66 borehole

it consists of 73 m of greenish variably argillaceous limestone and calcareous shale; conodonts from the upper part of the formation in the well were assigned a Late Maysvillian to Richmondian age (*in Mayr et al.*, 1978). On southernmost Ellesmere Island the Irene Bay Formation (40 m) comprises moderately fossiliferous lime mudstone with dolomitic-argillaceous partings (Mayr, 1982).

On Cornwallis Island in the Resolute Bay L-41 well (Fig. 1.1, borehole 6) the Irene Bay Formation is present from 1034.8 to 1072.9 m where it comprises argillaceous limestone interstratified with calcareous shale containing fragments of ostracods, crinoids and trilobite fragments (Mayr, 1978).

In the subsurface of northeastern Bathurst Island the Irene Bay Formation was described by Mayr (1980) as a 10 to 60 m thick green shale and limestone. The shale is a distinctive olive to waxy greenish-grey colour in two of the three wells (Mayr, 1980). A mid-Maysvillian to early Richmondian age was assigned to conodonts derived from outcrop samples on Bathurst Island (Barnes, 1973).

On northwestern Devon Island the formation is less continuous and less shaly than elsewhere according to Morrow and Kerr (1977) who treated the Irene Bay Formation as a local shaly facies that grades into the Thumb Mountain Formation. On southern Devon Island, the Irene Bay Formation is mainly a pale sky-blue weathering 45 m thick argillaceous mottled limestone; pentamerids are abundant and a *Virgiana*(?) was reported between 1.2 and 3.0 m below the top of the formation (*in Miall and Harding*, 1971). More recently, a thickness of 6 to 16.5 m was specified for the formation by Thorsteinsson and Mayr (1987).

On Somerset Island the Irene Bay Formation is up to 97 m thick in outcrop, consisting of limestone containing the Arctic Ordovician fauna (Miall and Kerr, 1977). Clay content decreases southeast from Devon Island and the formation was not recognised in the present study on Brodeur Peninsula. A similar bluish-grey weathering zone was, however locally present in the basal 60 m of member B of the Baillarge Formation (Plate XII.1A).

Irene Bay Formation in the Garnier O-21 Borehole

The Irene Bay Formation was assigned to the interval 1264.9 to 1285 m by Mayr (1978) and this assignment is followed here. Drill cuttings analysed in the present study (Appendix 3, Figs V.2 and J in pocket) suggest that the Irene Bay Formation consists mainly of locally argillaceous limestone with lesser amounts of dolostone, calcareous dolostone and sparry mudstone (Figs. V.2 and J in pocket). A distinctive light greenish-grey sparry mudstone (17%) is marked by a high off-scale gamma ray deflection from 1278 to 1285 m.

E. ALLEN BAY FORMATION AND EQUIVALENTS

Description of the Type Locality and Other Areas

The basal part of the Allen Bay Formation is considered to be correlative with the Cape Crauford Formation and for this reason is described here in some detail. The name Allen Bay Formation was first applied by Thorsteinsson and Fortier (1953) to a succession of dolostone beds in the southern part of Cornwallis Island. According to these authors (1953, p. 9)

The Allen Bay formation comprises a series of generally greyish yellow, yellowish grey, light grey to medium grey, very thick to thin-bedded, massive to slabby, fine-grained to coarse-grained dolomite. Highly porous strata are locally abundant, particularly in the vicinity of Resolute Bay, and porous strata, bearing much solid bitumen, have been observed cropping out along the axis of the Allen Bay and Resolute Bay anticlines. Limestone is only present locally. Beds of the Allen Bay Formation generally weather to saccharoidal masses on gentle slopes, whereas cliff faces may weather with characteristic lattice or pockmark patterns.

Fossils in the Allen Bay Formation are rare according to Thorsteinsson and Fortier (1953), though some silicified fossils, including mainly stromatoporoids and colonial corals were identified locally in biostromes. The upper hundred metres or so of the Allen Bay Formation contains coquina of *Conchidium knighti* Sowerby and ostracoderm plates. On the northeast coast of Cornwallis Island lowermost Wenlockian graptolites are associated with this species of ostracoderm (Thorsteinsson and Fortier, 1953).

Thorsteinsson (1958, p. 42) later re-defined the Allen Bay Formation as a ...uniform succession of mainly dolomitic rocks overlying Cornwallis strata with

sharp but conformable contact and underlying the Read Bay Formation with conformable and gradational relations.

The type section was chosen at a small unnamed creek north of Resolute Bay. Thorsteinsson (1958) noted that despite almost continuous exposures of 1,463 m at the type section, no well-preserved fossils were discovered though indeterminable moulds and casts possibly of corals and stromatoporoids were found. Based on brachiopods, graptolites, a trilobite and ostracoderms, Thorsteinsson (1958) suggested an Ashgillian to early Wenlockian age for the Allen Bay Formation.

The Allen Bay Formation was later studied by Thorsteinsson and Kerr (1968) on Cornwallis and Griffith Island (south of Cornwallis Island, Fig. 1.1) where it rests on the Irene Bay Formation with abrupt but conformable contact. On the south coast of Griffith Island the formation is 1,686 m thick of which ninety percent consists of thin- to thick-bedded, dense to porous, vuggy dolostone. The remainder includes dolomitic limestone and limestone, petroliferous calcareous shale and argillaceous limestone. The basal 8 m consists of dolostone, limestone and mottled limestone (Thorsteinsson and Kerr, 1968). On Somerset Island the Carbonate-Evaporite Sequence is lithostratigraphically correlated with the Allen Bay Formation of Cornwallis Island (Fig. V.1).

The apparent similarity of the exposed strata of Somerset Island and Brodeur Peninsula was alluded to by Jameson (*in* Parry, 1826). Although Jameson did not accompany the expedition, he was impressed by the similarity of rocks collected on either side of Prince Regent Inlet, and following the reports of members of the expedition stated that the gypsum of North Somerset Island (p. 147) "...occurs more than a hundred feet above the level of the sea, and, with its slaty limestone, rests on the more common and compact kinds, which agree in every character with those of Port Bowen." He also stated (p. 147) that the Somerset Island strata "...affords the same organic remains as the limestone of Port Bowen, with additional species of [*Modiola*]." Following the reports of members of the expedition Jameson concluded (p. 145) that "The whole country travelled over on both sides of... [Prince Regent]'...inlet appeared to consist of secondary limestone, with subsidiary beds of gypsum." It is now clear that the light coloured carbonate strata of Brodeur Peninsula were misidentified

as gypsum from a distance and it should be mentioned in this regard that Dr. Neill, the Ship's surgeon and naturalist did not identify any gypsum at Port Bowen. While Jameson referred to the similarity of these rocks he also stated (*in* Parry, 1826, p. 147) that "From the data before us, it is not easy to refer all the limestones of Prince Regent's Inlet to their places in the geognostical series."

Much later, evaporitic strata exposed on Somerset Island were correlated with the Cape Crauford Formation of Brodeur Peninsula by Norris (1963), Mayr (1975), Miall and Kerr (1977, 1980), Dixon and Jones (1978), and Dixon *et al.* (1981). Mayr (1978) correlated the interval from 236.2 to 815.0 m in the Garnier well with the Cape Crauford Formation of Brodeur Peninsula. Although Mayr (1982) later recognized that this carbonate-evaporite sequence was not the Cape Crauford Formation the terminology has persisted and the Cape Crauford Formation appears on the geological maps of Somerset Island prepared by Stewart and Kerr (1984a, b, c, d). This confusion has arisen from the assumption that the breccias of Brodeur Peninsula are solution breccias formed by the dissolution of bedded evaporites from strata lithostratigraphically correlative with the uppermost carbonate-evaporite sequence of Somerset Island (Norris, 1963). Although a seemingly logical assumption at the time, given the reconnaissance nature of the work there are three main problems with this approach:

1. According to the North American Commission on Stratigraphic Nomenclature (1983), formations are named on the basis of lithology, not inferred geological relationships. Mappable units containing breccias are therefore separate from those containing evaporites.
2. The breccias of Brodeur Peninsula are carbonate solution breccias rather than evaporite solution breccias, a conclusion reached during the present study.
3. Lithostratigraphic correlations undertaken here show that the lower member of the Cape Crauford Formation correlates well with the very basal non-evaporite bearing unit A of the carbonate-evaporite sequence on Somerset Island. Since correlation of this carbonate-evaporite sequence with strata of other areas has caused so much confusion in the past it is described here in some detail in order to emphasize regional lithofacies

changes.

There are no beds of evaporites in the Brodeur Group on Brodeur Peninsula and with the exception of traces of gypsum as carbonate pseudomorphs and moulds (most of which are diagenetic), there is no evidence of former evaporites in the Brodeur Group.

The carbonate-evaporite sequence, which occurs from 234 to 1265 m in the Garnier O-21 well on northeastern Somerset Island was assigned to the Allen Bay Formation by Mayr *et al.* (1980). However, the Allen Bay Formation does not contain evaporites in the type area and for this reason strata in this interval are referred to here informally as the carbonate-evaporite sequence. This follows the practice of Reinson (1978) who completed the most detailed study of this sequence in the coastal cliff exposures of Somerset Island, and referred to it informally as the carbonate-evaporite sequence. Similarly, Jones and Dixon (1975) originally referred to this sequence in outcrop as the unnamed carbonate sequence. The carbonate-evaporite sequence is considered here to be a lithofacies equivalent of the Allen Bay Formation. On southwestern Devon Island west of Maxwell Bay, the basal 165 m of the Allen Bay Formation, where it overlies the Irene Bay Formation, was described by Glenister and Thorsteinsson (1963, p. 199) as an

...intermixed medium light grey to olive grey, aphanitic to fine-grained limestone, and light grey to yellowish grey fine-grained dolomite. Both rock types are represented in approximately equal quantities and exist as intimate intergrowths of one another.

They also mentioned that these strata differ somewhat from the Allen Bay Formation at the type locality and their description is very similar to that of the lower member of the Cape Crauford Formation on Brodeur Peninsula. It differs only in that the fossils were assigned by Sinclair (*in* Glenister and Thorsteinsson, 1963) to the Late Ordovician rather than the Early Silurian. The upper 6 m of the section on Devon Island was described as olive-green and dusky-red purple limestone which was considered to be Silurian on the basis of *Paleofavosites* cf. *P. groenlandicus* and a questionable *Rhipidium* (*in* Glenister and Thorsteinsson, 1963). This 6 m thick limestone may be a lithostratigraphic correlative of the thick distinctive limestone bed at the base of the upper member of the Cape Crauford Formation on Brodeur Peninsula (Plates XII.1B,C, 3B, 4A, 8A). A most important composite section (Fig. V.1,

section C), in terms of correlating the strata in the Garnier well with those of Brodeur Peninsula was described by Sproule and Associates Ltd. west of Maxwell Bay on Devon Island (*in Miall and Harding, 1971*). The Allen Bay Formation at this locality is 653 m thick and overlies the Irene Bay Formation. While the basal 124 m (here designated unit A) is covered, the talus consists of finely laminated pale grey to white dolostone and dark grey to brown medium bedded partly fossiliferous dolostone (*in Miall and Harding, 1971*). Apparently, the section measured by Sproule and Associates is slightly thinner and represents the dolomitized equivalent of the section measured by Glenister and Thorsteinsson (1963). It is lithostratigraphically correlated here with the lower member of the Cape Crauford Formation on Brodeur Peninsula and is similarly correlated with unit A of the carbonate-evaporite sequence in the Garnier O-21 borehole, divided informally into units A to H in the present study (Fig. V.2).

The Allen Bay Formation of southern Devon Island contains solution breccias near Crocker Bay and Radstock Bay (Figs. I.1 and V.1) according to Thorsteinsson and Mayr (1987), who interpreted them as evaporite solution breccias. The solution breccia in the middle member of the Allen Bay Formation near Crocker Bay, however, occurs just above a thick sequence of the relatively impermeable lower member of the Allen Bay Formation, which is reminiscent of the Baillarge Formation aquiclude on Brodeur Peninsula (chapter IX). The section near Radstock Bay, Devon Island is generally unfossiliferous, however and the breccias there may be evaporite solution breccias as interpreted by Thorsteinsson and Mayr (1987).

Carbonate-Evaporite Sequence in the Garnier O-21 Borehole.

Unit A (1142-1265 m)

Taken as a whole and calculated on the basis of averaged percentages of cuttings over the interval, unit A in the Garnier borehole consists of sparry very fine to fine crystalline dolostone (46%), limestone (40%), dolostone (12%), dolomitic limestone (2%) and gypsum (less than 1%) (Figs. V.2 and J in pocket). The limestone varies in composition from micritic

microsparite to fine crystalline sparite. Intercrystalline bitumen, chert, pyrite, green shale, siltstone and very rare grains of very fine crystalline granite and quartz were present in trace amounts. Ossicles and rare ostracods comprise the only fossils. A relatively featureless log response, the absence of evaporites and the decreasing upward limestone content suggest a shallowing-up subtidal sequence similar to that of the lower member of the Cape Crauford Formation on Brodeur Peninsula. Earlier, Mayr (1978) correlated the Cape Crauford Formation of Brodeur Peninsula with strata in the interval 236.2 to 815 m in the Garnier borehole, several hundred metres higher. The revised correlation proposed here requires that the lower member of the Cape Crauford Formation is diachronous. Just such a diachronous situation may occur, however in Foxe Basin where map unit OScb, lithologically similar to the Cape Crauford Formation, could range in age from Late Ordovician to Llandoveryan (Trettin, 1975). It is therefore possible that the lower member of the Cape Crauford Formation is diachronous both to the northwest and southeast of Brodeur Peninsula. If this is correct, it follows that the Late Ordovician and Llandoveryan part of member B of the Baillarge Formation of Brodeur Peninsula changes facies from a mottled dolomitic limestone to the interbedded limestone and dolostone of unit A at the base of the Allen Bay Formation on southern Devon Island (Fig. V.1).

The Ordovician-Silurian boundary is very tentatively placed at 1205 m in the Garnier borehole to coincide with a change from fossiliferous to unfossiliferous strata, a rare occurrence of sand grains, and a loss of circulation. There are only 4 other depths where circulation was lost, one in unit B and the others in the Bay Fiord Formation.

Unit B (1028-1142 m)

Unit B from 1028-1142 m in the Garnier borehole, when considered as a whole, consists of dolostone (95%), gypsum (4%) and shale and dolomitic limestone (less than 1%). The dolostone is similar to that of unit A of the upper member of the Cape Crauford Formation but locally contains up to 1% rounded quartz grains (to 700 μ m in size) and intercrystalline bitumen (2%). The gypsum is mainly white, aphano- to very fine crystalline with small quantities of selenite. Traces of black shale occur throughout the unit and there is a

distinctive waxy light green shale at a depth of 1089 m which is marked by a high gamma ray value; because the proportion of shale is only 15% in a single 3.05 m sample this shale, if it is all one bed has a maximum thickness of 0.5 m. Quartz grains, though rare are commonly rounded and occur preferentially in the interval from 1045.5 to 1054.6 m. The log response and composition of samples suggest that beds of gypsum with a maximum thickness of about 20 cm occur in the dolostone. Unit B is considered here to have formed in a mainly intertidal to supratidal depositional environment which differs from the Cape Crauford Formation of Brodeur Peninsula by the presence of gypsum, sand and shale. It is otherwise very similar in thickness and lithology to unit A of the upper member of the Cape Crauford Formation.

Unit B of the Allen Bay Formation on Devon Island (Fig. V.1) is a 103 m thick fine to medium crystalline massive vuggy dolostone characterized by rough very large blocky talus containing poorly preserved corals (*in* Miall and Harding, 1971). This interval correlates well lithostratigraphically with unit B in the Garnier well and with unit A of the upper member of the Cape Crauford Formation, Brodeur Peninsula. Unit B in the Garnier well differs, however, because it contains gypsum (up to 5%) and is unfossiliferous in the borehole. An unconformity is postulated here between units A and B in the borehole based on the anomalously abrupt change in lithologies (Figs. V.2 and J in pocket); this unconformity is considered to extend both east to Brodeur Peninsula and northeast to Devon Island. Unit B on Devon Island is Silurian because it overlies the Silurian-bearing strata described by Glenister and Thorsteinsson (1963). This has been confirmed by Nowlan (*in* Thorsteinsson and Mayr, 1987) who identified middle Llandoveryan conodonts in units B to E inclusive on southern Devon Island (Fig. V.1).

Unit C (1000-1028 m)

Unit C in the Garnier well (1000-1028 m) is almost entirely very fine crystalline anhydrite with minor medium crystalline dolostone, dark grey to black shale, quartzose siltstone, white gypsum, selenite and spar. This 28 m thick anhydritic unit is thought here to have accumulated in a sabkha depositional environment at a time when the rate of basin subsidence kept pace with the rate of evaporite deposition. Unit C in the Garnier well is considered to be

a lithofacies equivalent of unit B of the upper member of the Cape Crauford Formation, Brodeur Peninsula and unit C of the Allen Bay Formation on southwestern Devon Island, neither of which contain evaporites (Fig. V.1). On Devon Island, unit C is a 51.5 m thick covered interval according to Sproule and Associates Ltd. (*in* Miall and Harding, 1971). The talus in this interval, however contains two lithologies, "...one is a light brown, finely crystalline, very calcareous 10-15" bedded dolostone, the other a dark grey to black thin-bedded cryptocrystalline limestone..." (*in* Miall and Harding, 1971). In terms of lithology and thickness it is similar to unit B of the upper member of the Cape Crauford Formation on Brodeur Peninsula (Fig. V.1). It is not, however, similar to units C and D in the Garnier borehole, which contain a considerable quantity of anhydrite. These data may best be explained by considering a lithofacies change, perhaps related to uplift on eastern Somerset Island at this time in the Early Silurian. In sharp contrast with the Garnier borehole, there are no evaporites anywhere in the 653 m thick section of the Allen Bay Formation on Devon Island (*in* Miall and Harding, 1971). However, about 70 kilometres to the northwest in the Devon E45 borehole the upper 317 m of the Allen Bay Formation consists of dark brown medium crystalline dolostone interbedded in the lower part with minor anhydrite and pelletal limestone. This suggests a lithofacies change to the northwest on Devon Island (Fig. V.1).

Unit D (932-1000 m)

Unit D in the Garnier borehole consists of very fine to medium crystalline partly gypsiferous dolostone (91%), limestone (4%), anhydrite (3%) and subsidiary dolomitic limestone, calcareous dolostone and white gypsum/selenite. It comprises a stacked sequence of intertidal to supratidal sabkha cycles that is considered here to correlate with the non-evaporitic unit D of southwestern Devon Island.

Unit E (677-932 m)

Unit E in the Garnier borehole, taken as a whole, comprises dolostone (63%), anhydrite (14%), limestone (9%), dolomitic limestone (5%), calcareous dolostone (5%), gypsum (3%) and shale/mudstone (less than 1%) (Figs. V.2 and J in pocket). The dolostone, which is partly argillaceous and anhydritic, contains intercrystalline and vuggy porosity (up to 25%)

some of which is filled with bitumen. The anhydrite is very fine to fine crystalline though rare clear anhydrite crystal fragments (to 1 mm in size) are also present. The gypsum is white, very fine to fine crystalline and the shale is always dark grey. Rare ossicles constitute the only fossils. The interbedded nature of the various lithologies as determined from the proportion of lithologies in single samples and rare fossil fragments suggests the presence of shallow subtidal to supratidal sabkha cycles.

Unit F (507-677 m)

Unit F in the Garnier borehole, taken as a whole, consists of dolostone (24%), anhydrite (20%), limestone (20%), calcareous dolostone (17%), dolomitic limestone (10%), gypsum (8%), shale/mudstone (1%) and lesser quantities of sandstone, chert and siltstone (Figs. V.2 and J in pocket). Unit F, which contains the same rock types as unit E but in different proportions is considered to represent cyclical shallow subtidal to supratidal (sabkha) deposits.

Unit G (327-507 m)

Unit G, which is unfossiliferous, contains dolostone (75%), gypsum (20%) and minor amounts of anhydrite, shale/mudstone, limestone, calcareous dolostone, siltstone and chert.

The dolostone is locally anhydritic and mainly fine to medium crystalline with rare shale partings. Gypsum is evenly distributed throughout and comprises clear selenite and lesser amounts of fine to coarse crystalline gypsum.

The upper part of this unit in the borehole correlates well with the basal 49 m of a section measured by Reinson (1978) in cliff exposures 5 km east of the Garnier O-21 borehole. Six intertidal to supratidal cycles were recognised by Reinson (1978) in this 49 m thick section; contacts between these 'lithofacies' are sharp and concordant, though many show evidence of erosion. Reinson (1978) interpreted these to represent subtidal or lagoonal, intertidal and supratidal deposition. Each of these are briefly summarized below after Reinson (1978) who employed Dunham's (1962) classification of carbonates.

The subtidal or lagoonal deposits were described as pelletoidal wackestone containing ostracods and thin-shelled brachiopods, finely laminated mudstone and massive mudstone.

The high subtidal to low intertidal deposits were considered to comprise the finely laminated mudstones containing thin clay, organic-rich and quartzose silty laminae. Although planar lamination was observed as most common, ripple, micro-cross-, and disrupted lamination were also reported. The massive to thickly laminated vuggy mudstones were considered to comprise the shallow subtidal deposits.

The intertidal deposits were believed to consist mainly of dark brown carbonate mudstone (dolomitic in the basal 49 m) with included digitate stromatolites, cryptalgal laminite, gypsum crystals and moulds, laminated fenestral fabrics and birds eye structure porosity. Evidence of desiccation was especially common in the truncated cycles (Reinsson, 1978).

The supratidal deposits include gypsum beds (to 18 m thick) and dolostone with scattered chert nodules. Alabastrine gypsum was the main variety, but subsidiary porphyroblastic gypsum containing traces of relict anhydrite and veins of fibrous satin-spar were also noted. Birds-eye laminated dolostone was observed to gradationally overly the algal stromatolitic units (Reinson, 1978).

The thick beds of gypsum are thought here to have formed when the rate of evaporite deposition was balanced by the rate of subsidence. It is impossible to interpret depositional environments from drill cuttings in as much detail as was afforded Reinson from cliff exposures. However, the similar proportions of lithology, based on single samples of drill cuttings from the Garnier borehole suggest similar depositional environments in the subsurface (Figs. V.2 and J in pocket).

Unit H (234-327 m)

Unit H in the Garnier borehole is unfossiliferous and taken as a whole consists of calcareous dolostone (29%), locally silty and shaly dolostone (21%), gypsum (18%), limestone (16%), very fine to fine crystalline anhydrite (8%), dolomitic limestone (6%) and evenly distributed dark grey and silty shale (2%) (Figs. V.2 and J in pocket).

Calcareous dolostone, which is very fine to medium crystalline is also partly argillaceous and silty. Gypsum includes both a white opaque variety and clear to brown

selenite (crystal fragments to 1 mm in size). The limestone is locally silty, argillaceous and rarely gypsiferous. Seventeen lagoonal-supratidal sabkha cycles were recognized by Reinson (1978) in the basal 76 m of this 91.5 m thick unit where it occurs in nearby cliff exposures. In the borehole this interval differs from Reinson's basal 49 m in that more subtidal to supratidal cycles are represented. It also has a greater proportion of subtidal limestone and either thinner gypsum beds or thick units of interlaminated gypsum and carbonate. The rock types for the subtidal to intertidal 'lithofacies' of Reinson (1978) are the same as for those previously described for unit G in the borehole. A subtidal to supratidal depositional environment is proposed here for this unit.

F. LEOPOLD FORMATION

Description at The Type Locality and Other Areas

The Leopold Formation was studied in detail in cliff exposures by Jones (1974), Jones and Dixon (1975, 1977), Dixon and Jones (1978) and Dixon *et al.* (1981). The composite type section of the Leopold Formation was selected at Port Leopold, northeastern Somerset Island and Prince Leopold Island (Fig. 1.1) by Jones and Dixon (1975).

The contact with the underlying carbonate-evaporite sequence was traced 80 km south along the east coast of Somerset Island to Batty Bay (Fig. 1.1). This contact was considered to be conformable by these authors, a view supported by the overall upward increase in clay content starting 60 m below the Leopold Formation in the Garnier O-21 borehole (Fig. J in pocket).

The Leopold Formation in the Garnier O-21 Borehole

The Leopold Formation of northeastern Somerset Island was described here from drill cuttings from the Garnier borehole. Averaged over the Leopold Formation, which is 240 m thick, percentage compositions of drill cuttings suggest a section comprising calcareous dolostone (42%), limestone (22%), siltstone (10%), dolostone (9%), sandstone (8%),

dolomitic limestone (4%) and shale/mudstone (4%) (Figs. V.2 and J in pocket). The calcareous dolostone contains significant quantities of 'impurities', including anhydrite, gypsum, mica, clay and quartzose silt/sand. Similarly, the limestone is variously argillaceous, silty, gypsiferous or dolomitic. It comprises argillaceous microsparite and locally contains ostracods and sparse coated grains. Sandstone is always very fine grained and may be variously microsparitic, sparry, silty, micaceous, argillaceous, or dolomitic. The source for the clastic influx in the Leopold Formation was assumed to be a low-lying landmass immediately east of Somerset Island including the present area of Prince Regent Inlet (Jones, 1974). This source could be the Melville High if it represents an east-dipping west-directed thrust similar to that proposed for the Boothia Uplift by Okulitch *et al.* (1986). Fossils are rare and only ostracods and rare favositid corals were seen in drill cuttings. It is possible that units G and H of the carbonate-evaporite sequence, together with the overlying Leopold Formation are lithofacies equivalents of the Cape Storm Formation on southwestern Devon Island (Fig. V.1).

Dixon and Jones (1978) reported a Late Silurian age for the Leopold Formation based on late Ludlovian to early Pridolian conodonts from the basal units. This is confirmed by the presence of late Ludlovian or Pridolian ostracoderms (Loeffler and Jones, 1977). A Late Silurian age is, however, at odds with an Early Silurian (*celloni* Zone of the Llandoveryan) age based on conodonts obtained from the Leopold Formation in the interval 664.5-670.6 m (2180-2200 ft) in the Garnier O-21 borehole (*in* Mayr *et al.*, 1980).

G. CAPE STORM FORMATION

On western Devon Island, in the Devon E-45 borehole, according to Thorsteinsson and Mayr (1987), the Allen Bay Formation is overlain by a 431.6 m thick succession assigned to the Cape Storm Formation (Fig. V.1).

On southwestern Devon Island the Allen Bay Formation is overlain by an incomplete 404 m thick section assigned to the Read Bay Formation (*in* Miall and Harding, 1971). This section should now be referred to the Cape Storm Formation because it correlates with

equivalent strata in the Devon E-45 borehole. On southwestern Devon Island (section C, unit 1, Fig. V.1), the lower 50 m of the Cape Storm Formation consists mainly of thin-bedded limestone that locally contains stromatolitic structures and intraclasts; no evaporites or evaporite solution breccias were reported (*in* Miall and Harding, 1971). In the Devon Island E-45 borehole the Cape Storm Formation consists of calcareous, silty and argillaceous dolostone (Mayr, 1978; Thorsteinsson and Mayr, 1987). Conodonts recovered from core in the Devon E-45 borehole about 600 m above the base of the Cape Storm Formation are mid-Ludlovian to Pridolian in age (*in* Mayr, 1978). Quartzose sand, which is common in the Leopold Formation of northeastern Somerset Island, is absent from the Cape Storm Formation.

VI. PRE-BRECCIATION DIAGENESIS IN THE BRODEUR GROUP, BRODEUR PENINSULA

A. INTRODUCTION

The task of unravelling the diagenetic history is made easier to some extent because original constituents are sometimes easily distinguished from introduced cement. In general, because of the impure nature of the original carbonate sediments, calcite or dolomite, even when recrystallized has a cloudy, sometimes brown colour because of inherited clay, organic or other inclusions. With the exception of most of the calcite in the Baillarge Formation (e.g., Plate XII.39A, B) and seven samples from the Cape Crauford Formation which luminesce a uniform orange, the cloudy inclusion-rich, presumably marine carbonate is non-luminescent. This allows ready distinction of cement which is clear and commonly luminescent or fluorescent.

In the following treatment of diagenesis of the Brodeur Group a general sequence of major diagenetic events is followed, but some of the diagenetic processes have occurred repeatedly and are difficult to separate. For example, there are a number of episodes of dolomitization, and though these may be related to each other they are not easily related to many of the other diagenetic events. Dolomitization is therefore treated separately.

B. TRANSFORMATION OF MICRITE TO MICROSPAR AND SPAR

Minor amounts of micrite occur in about 10% of the 550 lithology samples but only about 3% contain more than 20% micrite (Plate XII.13E and samples A33, 80, 98, B19, C25a, 63, H78, T7, L2c, 5 and 7d). The micrite is equant anhedral intergrown calcite with intercrystalline porosity estimated at less than 5% (Plate XII.13F).

Microspar is much more common and volumetrically important than micrite, occurring in 53% of all samples. The transformation of micrite to microspar probably progressed by aggrading neomorphism in the usual manner (Bathurst, 1975) but the transformation of microspar to spar involved an increase in pore space. By definition this

must have been by a process other than or in addition to aggrading neomorphism. Spar, when occurring in microsparites is invariably concentrated along stylolites but is only rarely luminescent, suggesting that the spar may have formed from locally derived micrite or microspar. The proportion of spar is especially high in the breccias of the Jackson Inlet-Port Bowen area where it is common in both clasts and matrix. The formation of this spar may have been by a process similar to that accompanying surface weathering described by Chafetz (1972). In this regard, permeability probably controlled whether spar formation was exclusive to the surface or whether the effects extended into the rock.

C. EARLY DIAGENETIC SPAR CEMENT

Cement Associated With Peloidal Texture

The origin of peloids is in doubt except where they are present in graded or cross-stratified structures. For example, the peloids of unit J24, which are 25 to 100 μm in size, are unique because they are normally graded and occur in tangential cross-laminae, indicating that they are not diagenetically formed. They are coated with an isopachous fluorescent spar cement which tentatively suggests that peloids that do not occur in cross-stratified structures but have similar coatings may also be detrital in origin, perhaps even true faecal pellets. Isopachous scalenohedral spar cement coatings on peloids display fluorescent zonation in 18 samples (e.g., Plates XII.32A, B and 35C). These coatings are, however, never luminescent, though peloids in six of the samples are coated with thin bright orange luminescent overgrowths.

Isopachous scalenohedral spar cement between peloids is fluorescent and texturally similar to that illustrated in MacIntyre (1985), who considered repeated nucleation around growth centers in a submarine setting as the most likely origin of peloidal texture. Similar peloidal texture is present in the Brodeur Group, but it comprises low-Mg calcite, which differs from the high-Mg calcite of the young rocks studied by MacIntyre (1985). It is tempting to consider the isopachous cement around peloids as submarine in origin, but similar

cements around breccia clasts in the Brodeur Group suggest that isopachous rim cements may have formed in other environments such as the phreatic or vadose zone. For example, fluorescent or fluorescent-zoned scalenohedral spar lines vugs and fractures in 31 samples (e.g., Plates XII.27F, 28C, 30B,H, 32E,F, 36F, 38C and F). For this reason, peloidal texture in the Brodeur Group may not be attributable to submarine cementation.

Dull red luminescent peloids in a non-luminescent groundmass occur in two samples (C71 and J42), both of which are situated near the boundaries of stratigraphic units. How this luminescence is related to stratigraphic boundaries, if at all, however, is not apparent.

Precipitation of Calcite Overgrowths On Ossicles

Syntaxial calcite overgrowths on calcitic echinoderm ossicles are rare, occurring only in samples C25d, H45 and J29. On the other hand, dolomitic syntaxial overgrowths on dolomitic echinoderm ossicles are more common (samples B4, C1, D1b,9b, J78 and K4). Because these all occur in dolostone, it is probable that the dolomitic overgrowths represent early diagenetic calcitic overgrowths that were later dolomitized along with the rest of the rock. Commonly, the overgrowths are fluorescent but not luminescent (Plate XII.33A-C).

Geopetal Fabric

Geopetal fabric as 'spar-over-peloid' or 'spar-over-microspar' texture is rare, occurring only in gastropods, colonial corals, articulated ostracods or brachiopods (samples C33, E61, J48 and L8d and Plate XII.14E). Geopetal spar is known to be a common early cement in modern carbonates (Bathurst, 1975), and undoubtedly this fabric was formed prior to compaction. The rarity of this fabric in fossils suggests that spar cementation was of minor importance until or after brecciation. One possible exception to this is the submarine cementation discussed previously.

D. STYLOLITES

The stylolites of Brodeur Peninsula include the entire spectrum from non-sutured seam solution such as microstylolites and microstylolite swarms to sutured seam solution (Wanless, 1979). The amount of dissolution is related to the concentration of insoluble residue in the rock and residue thickness. Stylolites include low-amplitude 'wispy' stylolites (Plate XII.14D and F) to high-amplitude columnar stylolites (Plates XII.15A,B, 19A-D, 23A, 35A-F). In rare cases low-amplitude stylolites in unbrecciated rock may be traced laterally into high-amplitude stylolites in subvertical breccia veins (Plate XII.22F). They may also truncate convex-up structures many of which are themselves dissolution structures (Plate XII.15C). Where these columnar stylolites are close together, they impart a subvertical lineation to the exposures (unit G31 and Plate XII.19B and D).

In the Brodeur Group, insoluble residue is generally thin along low-amplitude stylolites and thick along high-amplitude stylolites. For example, residue along high amplitude (15 mm) columnar stylolites in sample C17a (Plate XII.19C) is up to 400 μ m thick. Similarly, residue 75 μ m thick is present along the high-amplitude (15 mm) stylolites in sample B22 (Plate XII.15A) and residue 250 μ m thick occurs along the high-amplitude (10 mm) stylolites of sample H1 (Plate XII.25A, B). There are exceptions to this, undoubtedly related to the original concentration of insoluble residue, but perhaps also to partial dissolution of the 'insoluble' residue itself. The amount of material dissolved is commonly considerably more than the maximum amplitude of the stylolites. For example, in sample C25 (Plate XII.10B), the outer lamellae of the lower stromatoporoid are truncated by a high amplitude (2 mm) stylolite. By tracing the truncated lamellae laterally it can be shown that about 10 mm of the outer part of the stromatoporoid have been dissolved, a value five times the amplitude of the stylolite. Similar examples are common (Plate XII.30A, B). In some mosaic breccias it is evident that movement between breccia clasts was several centimetres, yet stylolites in the matrix are low-amplitude. In other cases, the stylolite concentration is extremely high between breccia clasts (Plate XII.15D). Dissolution of equal amounts of carbonate may therefore occur either along a few high-amplitude stylolites (each marked by thick residue) or along

many low-amplitude stylolites (each marked by thin residue). With the exception of fluorescent stylolites in sample C13 and very dull green luminescent stylolites in sample D19, stylolites are neither luminescent nor fluorescent.

The formation of spar along stylolites may have accelerated stylolite growth owing to the higher intercrystalline porosity of spar compared to microspar. This process is associated with stylolitization and fracturing because spar occurs preferentially where stylolites are vertically closest together (e.g., sample J12). Spar that lines stylolites and fractures in the dolostone of samples C79, H45 and J55, 56 and 58 is, on the other hand, a cement. Dolomite near stylolites is very common in the Brodeur Group because stylolites or zones near stylolites are porous and permeable, allowing dolomitizing solutions to pervade rock adjacent to the stylolites. Large dolomite rhombs are not present along stylolites in the form of insoluble residue but are dissolved along the stylolites (e.g., sample A53).

Stylolites that bifurcate and reunite laterally (samples E85, J72 and L3) or are developed at right angles to bedding in which the stylolitic columns are parallel to bedding (sample E7a) are rare. The lack of stylolites developed at right angles to bedding is good evidence for a lack of directed tectonic stresses (Wanless, 1979). High-amplitude stylolites (amplitudes of at least 2 mm) in the lower member of the Cape Crauford Formation are most common in the breccias (48%) and much more common in the light coloured limestones (43%) and dolomitic limestones (26%) than in the dolomitic rocks. If this is considered with the fact that the variously dolomitic carbonates are interstratified, then a reasonable conclusion is that most of the stylolites were formed after dolomitization. A higher percentage occurrence than was actually observed would be expected in the light coloured dolomitic rocks if they had been formed prior to dolomitization. It is also clear that most of the dolomitization in the lower member of the Cape Crauford Formation preceded brecciation simply because breccia clasts of dolostone occur intermixed with limestone clasts in some of the breccias. Furthermore, it is known that the brecciation occurred at the time of subaerial exposure between deposition of the upper and lower members of the Cape Crauford Formation (chapters VIII and IX). Therefore, most of the stylolites in the lower member of

the Cape Crauford Formation were formed after dolomitization but accompanied the intra-Llandoveryan brecciation. The depth of burial required for this stylolitization accompanying brecciation was therefore at most the thickness of the lower member, or less than 135 m, assuming no erosion of the lower member. In fact, breccias in the lower member are rare in the uppermost 20-30 m, suggesting that the Llandoveryan stylolitization accompanying brecciation required at least this depth for formation. Although high-amplitude stylolites now occur in this 20-30 m interval, these probably represent a later episode of stylolitization, a likely event considering the 7 km or so depth to which these strata were buried (chapter X). The depth at which stylolites form is controversial. Some workers, such as Flügel (1982) suggest that stylolites may form soon after deposition. It may be that vadose diagenesis (more specifically carbonate dissolution) contributes to the 'pressure-solution' mechanism of stylolite formation. There is indisputable petrographic evidence that stylolitization is an intermediate step in the formation of stylo- or crackle breccias (chapter VIII and IX). Unbrecciated strata may grade upward to strata containing high-amplitude stylolites where fractures may terminate. Incipient crackle breccia clasts are defined where the density of subvertical fractures and high-amplitude stylolites become common. Further dissolution results in displacement between the breccia clasts, and results in transformation of some of the subvertical fractures to subvertical microfaults.

E. FRACTURES

Subvertical fractures which are lined or filled with cement and which commonly terminate at stylolites occur in 39 samples (e.g., Plate XII.35A-C, E). The distribution of these fractures is approximately equal in the Baillarge and Cape Crauford formations; twelve are in the Baillarge Formation, thirteen are in the lower member and three are in the upper member of the Cape Crauford Formation.

Although insoluble residue is common along stylolites it is rare along subvertical fractures (e.g., sample L3). By analogy with residue along stylolites, residue along fractures suggests pressure solution by means of laterally directed stresses. The rarity of this

phenomenon confirms that laterally directed stresses were both minor and localized.

F. PRECIPITATION OF CALCITE IN FRACTURES AND VUGS OF UNBRECCIATED ROCKS

Differentiation of cement types in fractures and vugs of unbrecciated rocks may be made according to (1) whether they are linings or fillings, and (2) by their luminescent and fluorescent properties. Non-fluorescent isopachous spar is much more common lining vugs and fractures than is fluorescent spar. Luminescent spar (whether fluorescent or not) is even less common and is present in only 9 samples.

Cementation of Fractures

Spar in subvertical fractures is either non-luminescent, uniformly luminescent or luminescent-zoned (Plates XII.29G, 30D, 35A-F and 36C,D). In general, luminescent overgrowths are confined to surfaces open to pore space.

Complex luminescent zonation of spar in fractures is rare, occurring in only two samples (A6 and D4). This type has been referred to as multifold zonation by Machel (1985). Far more common are either uniformly luminescent overgrowths or zoned luminescent overgrowths, both of which are dominant in the widest fractures. These overgrowth types are represented by two samples from the Baillarge Formation, 20 from the lower member and 2 from the upper member of the Cape Crauford Formation (E40 and J76). More importantly, all but two of these samples occur in the Port Bowen and Jackson Inlet area where the most extensive brecciation has occurred.

Uniformly luminescent calcite in 'hairline' fractures occur in 33 samples; these fractures, which are filled with luminescent calcite are so narrow and the calcite crystals so small that the nature of the luminescence is difficult to determine. Of the samples listed above, only 6 are from the Baillarge Formation whereas 27 are from the Cape Crauford Formation. The hairline fractures are more uniformly distributed geographically than are spar-lined fractures which implies that a prerequisite for precipitation of uniformly

luminescent overgrowths or zoned luminescent overgrowths is a sufficiently wide fracture. Not surprisingly, the widest fractures are concentrated in the most extensively brecciated rocks.

Subvertical fractures were filled with spar after dolomitization because all eleven samples which contain spar-filled fractures are dolostone. In the wider subvertical fractures scalenohedral spar, which may or may not be luminescent, lines the fracture walls and the fractures are filled with equant spar, which may or may not be luminescent.

Cementation of Vugs

To some extent, cementation in vugs is similar to that in fractures. Spar that lines vugs (Plates XII.27A-C, 28A-C) occurs in 79 samples, a third of which are dolostone. There is a much more even stratigraphic distribution of samples in which spar lines vugs than for spar which lines fractures, i.e., 29 are from the Baillarge Formation, 37 are from the lower member and 10 are from the upper member of the Cape Crauford Formation. This may be explained by the more diverse origins of vugs than fractures. For example, vugs occur in articulated ostracods, colonial corals, crystal or as fossil moulds whereas fractures are mainly related to karstification. A large number of irregularly-shaped vugs of indeterminate origin are undoubtedly solution-enlarged.

Though most of the spar lining is not luminescent, there are 29 examples of fluorescent or fluorescent-zoned spar. Of these, 12 are from member B of the Baillarge Formation, 16 are from the lower member and one is from the upper member of the Cape Crauford Formation. In addition, 22 samples contain luminescent or luminescent-zoned spar. Bright orange luminescent overgrowths are most common on spar open to pore space and may be gradational to spar filling pores. Alternatively, pore-filling spar may be a separate and unrelated cement. For example, in sample A16 thin bright orange luminescent calcite overgrowths occur on non-luminescent vug-lining spar.

There is some evidence that the fluorescent spar which fills vugs is early diagenetic because spar-filled vugs are commonly truncated by stylolites (Plate XII.30A, B). There are 34 samples containing vugs in non-breccias that are filled with non-luminescent and

non-fluorescent spar. Spar, which fills vugs and is fluorescent or fluorescent-zoned is present in 24 samples (Plates XII.31A,B, 36E, and 37D-F). In addition, spar may be luminescent or luminescent-zoned (Plates XII.27G, H and samples A90, B2a,4,6,8,19b, C2, D9b,16,24, and E42d). Only three samples (A90, C2 and E42d) contain vugs filled with both luminescent and fluorescent spar. These different cement varieties are vertically interspersed with each other in a manner similar to the various types of luminescent dolostone which provides yet further evidence that fluids were stratified and separated from each other in either time, space or both.

G. SILICA

Silica is most common as chert nodules replacing carbonate, but it also replaces fossil fragments, dolomite rhombs and, in addition fills pores. With the exception of very dull red-luminescent chert (sample C65), very dull green luminescent chert (sample H62), and blue luminescent detrital quartz (Plate XII.39E), silica examined in the present study was not luminescent.

Growth of Chert Nodules

Most chert beds and nodules were formed before brecciation because fragmented nodules are common in the breccias (Table IV.4). There is a consistently higher incidence of chert in light as opposed to dark rocks and this may be associated with differences in chert nucleation. Sixty-eight examples of chert nodules were observed in the measured sections on Brodeur Peninsula but only one was found in member B of the Baillarge Formation. The nodules are characteristically ellipsoidal, elongate subparallel to bedding, and usually range from a few millimetres to half a metre in length. In the lower member of the Cape Crauford Formation, brecciated chert nodules occur most commonly in breccias (28%) and are more common in the light than dark rocks, irrespective of the amount of dolomite (Table IV.4).

These data, together with the absence of chert in member B of the Baillarge Formation suggest that chert nodules were formed in the most permeable rocks and that a

secondary control may have been residue concentration. These factors may not be entirely unrelated because carbonate with a high concentration of residue is probably less permeable than pure carbonate. That high permeability is required for chert nodule formation is obvious from the low solubility (in parts per million) of silica in ordinary seawater or groundwater. Chert nodules half a metre long in the Cape Crauford Formation testify to the movement of thousands of pore volumes of water through the rock.

Brecciated chert nodules (Plate XII.22A) are common, a situation similar to the paleokarst of southwestern New Mexico where chert nodules up to half a metre long form some of the largest clasts in the breccia (Chafetz, 1982). On Brodeur Peninsula, bedded chert is absent though chert nodules are up to a few metres long in one case. Chert nodule-rich zones, on the other hand, may be laterally extensive and one of these (in unit H21) was traced laterally in cliff exposures for over 800 metres. Chert nodules are commonly fractured or brecciated, suggesting that most of them were formed prior to the fracturing and brecciation associated with karsting. In all but rare cases (sample C67) chert nodules are elongate parallel to bedding.

Other evidence that chert nodules were formed early includes stylolites and strata that commonly skirt above and below the nodules. If this deflection is related to compaction then the chert nodules were formed soon after deposition.

Silicification of Fossils, Dolomitic Mottles and Dolomite Crystals

Chert replaces ostracod valves (sample A31), corals (samples C25c, E42d and I2e), and a stromatoporoid (sample H62). In addition, spherulitic and fibrous chalcedony as well as polycrystalline quartz replaces and fills corallites in two samples (D9 and D9a). A more complex cementation history is illustrated by corallites that are replaced in part by spherulitic chalcedony, are lined with clear polycrystalline quartz and are filled with medium crystalline spar (sample E42b). Silicification occurred after dolomitization in units A84, 85, B8 and J71 because some of the dolomite rhombs are silicified. Further evidence of silicification after dolomitization includes white chert that locally replaces dolomitic mottles (units R6 and 8).

Silicification In Vugs and Along Stylolites and Fractures

Although most chert nodules were formed prior to brecciation there is also evidence that silicification continued after brecciation. This evidence includes (1) diagenetic quartz that is concentrated both along stylolites (samples A43, J78, I2e and R6) and fractures (sample A65) and (2) rare banana- or bowl-shaped convex-up chert nodules (unit A87) that follow the overlying convex-up contact between breccia and non-breccia (Plate XII.17A). Because the convex-up contact between breccia and non-breccia was formed by the end of brecciation, the banana-shaped chert nodules were formed after brecciation. Rare evidence of late cementation by silica is provided by an articulated ostracod in sample E45 that is lined with dolomite, then sparite, and is filled with polycrystalline quartz. Another rare type of pore-filling quartz contains a number of inclusion-rich zones (Plate XII.37A-C). There is no doubt, therefore, that silicification continued after stylolitization and brecciation, though the amount of silica is of minor volumetric importance compared with early diagenetic silicification associated with the formation of chert nodules.

VII. DOLOMITIZATION, CALCIFICATION OF DOLOMITE AND LEACHING

A. INTRODUCTION

Dolomite is, volumetrically at least, a very important mineral in the Brodeur Peninsula strata, especially where pervasive dolomitization has occurred in the Ship Point Formation and unit A of the upper member of the Cape Crauford Formation. There are a number of petrographically different types of dolomite, including various luminescent and fluorescent varieties.

The various generations of dolomite are summarized below based on textural and compositional characteristics. Calcified dolomite is generally present in minor amounts, but is absent from the pervasively dolomitized strata. It is otherwise evenly distributed in both brecciated and unbrecciated strata. Leaching of carbonate is reflected by various types of diagenetic structure, and of course breccia is its most obvious expression.

B. PRE-BRECCIAATION DOLOMITIZATION

Introduction

A heterogeneous assemblage of breccia clasts, including dolomitic clasts requires that certain strata were dolomitized prior to brecciation. The main brecciation event occurred at the time of subaerial exposure prior to deposition of the upper member of the Cape Crauford Formation. This requires that dolomitization of strata was early, probably soon after deposition. Early dolomitization is also hinted at by dolomite that is concentrated inside rather than between intraclasts (Plate XII.12B). This suggests that dolomitization occurred before rip-up of the intraclasts.

Syn depositional Dolomitization

Dolomitization in the alternating calcitic and dolomitic laminae of the club-shaped stromatolites of samples C44 and C44a are probably syn depositional (Plate XII.12E). Similar

alternating laminae have been described by Gebelein and Hoffman (1973) who attributed the alternation to algal action. These structures (Plate XII.12E) are interpreted as stromatolites rather than diagenetic convex-up structures because they have a tapering-up club-shape, which is generally absent in the diagenetic structures.

Growth Form of Dolomite

Some of the dolomite has an elongate anhedral growth form that is common in microsparites (Plate XII.34A). In this form, two opposite faces of dolomite rhombs are anhedral and the other two opposite faces are euhedral. In more extreme elongate growth forms one pair of anhedral faces is developed at the expense of the other pair of faces which may be unrecognizable (Plate XII.34B). The most extreme lath-shaped forms are exemplified by extremely elongate anhedral dolomite (Plate XII.34Ca and samples P7A and R3).

Limpid Dolomite

Alternating spar and dolomite linings in articulated brachiopods, though rare (Plate XII.27A, B and C) are very important in terms of understanding diagenesis. Cement coatings of alternating calcitic and dolomitic lamellae on brachiopods, in addition to alternating calcitic and dolomitic cement linings are even more rare (sample E47) but obviously formed in a similar manner. This complex cementation must have involved the alternating precipitation of dolomite and calcite, a process common in mixed marine-freshwater diagenesis (Folk and Land, 1975; Jones *et al.*, 1984). The direct precipitation of dolomite is facilitated by a Mg:Ca ratio of 1:1 in mixed marine-fresh waters (Folk and Land, 1975). This evidence of brackish water cementation also lends some credibility to the concept of brackish water dolomitization. None of the articulated brachiopods are crushed, which implies that this cementation probably occurred prior to compaction.

Dolomitization Along Stylolites And Subvertical Fractures

Dolomite is commonly concentrated along and around stylolites, subvertical fractures and bed boundaries, a distribution that is to be expected considering that these are the most permeable fluid pathways. Partial replacement of spar cement by dolomite along fractures, for example, must be relatively late diagenetic (e.g., sample P9A). In addition, late diagenetic dolomite along stylolites can be recognized by anomalously large crystals compared with smaller dolomite crystals in the rest of the sample (e.g., sample C23). Although dolomite may appear to be homogeneous in thin section (Plate XII.27D), luminescence commonly reveals different generations of dolomite with different luminescent zones or even different luminescent colours (Plate XII.27E). Up to 14 distinctive cement luminescent zones have been observed in dolomite cement linings (Plate XII.27E) but there are generally less than 5. In addition, fluorescence may be distinctive in colour in dolomite crystal cores (Plate XII.27F). There are many examples of dolomite-lined fractures (samples A14, 19, 27, B4, 6, 7, 8, C2, 11, 12, 64, 65, D1c, G39c and J78); because these all occur in dolostone it is reasonable to assume that the dolomite-lined fractures were originally spar-lined. The sparry calcite was later dolomitized at the same time as the rest of the rock.

If it is true that the sparry calcite was later dolomitized at the same time as the rest of the rock, then spar which lines fractures in dolostone is a post-dolomitization calcite cement. More complex cases include dolomite-lined and spar-filled fractures (samples A27, C64, 65, D1b, G39a) but the same concepts apply. The sparry calcite-lined fractures were dolomitized along with the rest of the rock and the still open fractures were later filled with spar. Exceptions in which fractures in limestone rather than dolostone are lined by dolomite and then spar (sample D8) are rare. These alternating sparry calcitic and dolomitic cement linings may be explained in a manner similar to the alternating dolomitic and calcitic cement linings of brachiopods (Plate XII.27A-C), i.e., that they are mixed fresh-marine water cements.

Dolomitization Near Burrows To Form Dolomitic Mottles

Dolomitic mottles vary from a few millimetres in size (Plate XII.14B) to large irregularly-shaped mottles (Plate XII.10A). They are generally subparallel to bedding though there are rare cases of subvertical dolomitic mottles (Plate XII.10D). The latter should not be confused with dolomitized areas adjacent to joints and subvertical fractures (Plate XII.10A). Stylolites commonly pass through dolomitic mottles or form the upper and lower mottle boundaries (Plate XII.14D). The mottles generally skirt fossils (Plates XII.10A,B,C and D). One sample, however is unusual, because the mottles do not skirt the *Catenipora* colony but are present throughout it (Plate XII.14C).

Textural data suggest that the dolomitic mottles formed early, at least prior to brecciation. For example, in the crackle breccia of sample J21, dolomitic mottles are offset by small faults, a texture that requires brecciation after mottle formation. Other evidence for early diagenetic formation includes mottles (in this case calcified dolomitic mottles) that are truncated abruptly by flowstone. Flowstone lines a fracture in the uppermost part of the Baillarge Formation (Plate XII.14A), a texture that requires dolomitic mottle formation prior to fracturing and formation of flowstone. Although burrows in mottles were never observed, the mottles are considered to represent diagenetically altered burrows because they sometimes occur as irregular meandering and branching patterns on bedding planes. Because large bedding plane exposures are rare, and because the high concentration of these structures make identification of individual burrows difficult, good examples are rare.

In addition to the large dolomitic mottles, small dolomitic 'tubes', as diagenetically altered trace fossils may be conveniently classified according to size and shape. Whether the 'tubes', which are relatively rare are different from those which are assumed to have been originally present inside the larger centimetre-sized mottles is not known. However, small (1 mm-sized) 'tubes' along which dolomite is concentrated were observed in one sample (J2) along with the usual centimetre-sized dolomitic mottles. One to 2 mm-sized dolomitic mottles occur in samples P7 and H72 (Plate XII.12F) and 3 to 4 mm-sized mottles are present in units P3, 9 and Q9. Irregularly-sized mottles, a few millimetres in length, and composed of

microspar are present in sample D36 in a variously dolomitic 'matrix' (Plate XII.13A). However, their irregular shape and microsparitic as opposed to dolomitic composition suggests a solely diagenetic origin. In addition, many of the thin wispy dolomitic mottles which are less than a millimetre thick undoubtedly represent irregular dolomitization along stylolites. Dolomitic mottles are rarely altered to white, irregularly-shaped bodies resembling concretions (samples E57, G45, Q22 and 25), the centers of which are typically chalky white, porous, microcrystalline and poorly indurated.

Discordant Dolomitization

Although rare, examples of discordant dolomitization allow insights into the relative timing and type of dolomitization. Residue or possibly cement along subvertical fractures was a sufficient permeability barrier to prevent dolomitization on one side of the fracture shown in Plate XII.13B. Such cases imply horizontal as opposed to vertical movement of the dolomitizing fluids. This supports the luminescent evidence for horizontally interstratified dolomitizing water bodies. Examples of selective discordant dolomitization but without a fracture-related permeability barrier are rare. Perhaps the best example is sample H72 (Plate XII.12F) in which calcareous columnar stromatolites are separated by dolomitized bioturbated dolostone. Dolomite also occurs preferentially between stromatolites in member A of the Baillarge Formation (sample N10a). Presumably, dolomitization of the more permeable material between stromatolites occurred after bioturbation but before compaction and cementation.

C. PERVASIVE LATE DIAGENETIC DOLOMITIZATION WITH PRESERVATION OF DOLOMITIC MOTTLE OR BRECCIA GHOST TEXTURE

Introduction

Pervasive dolomitization is most extensive in the Ship Point Formation, the upper part of member A of the Baillarge Formation and unit A of the upper member of the Cape

Crauford Formation. The uppermost part of the Baillarge Formation at Jackson Inlet and Port Bowen has also been pervasively dolomitized to a fine to medium crystalline dolostone. Individual dolomite rhombs commonly have inclusion-rich cores and clear rims (samples G47, H42 and H55) which are either non-luminescent or uniformly orange to red luminescent.

Uniformly Orange to Red Luminescent Dolomite

About 120 thin sections contain uniformly orange to red luminescent dolomite. This dolomite is scattered throughout the Brodeur Group and the Ship Point Formation and is common in pervasively dolomitized units such as unit A of the upper member of the Cape Crauford Formation. The most important observation, however is that the orange to red luminescent dolostone is vertically interspersed with non-luminescent dolostone. Luminescent dolomite in the Cape Crauford Formation normally occurs in a groundmass of non-luminescent calcite, suggesting that the trace element or elements responsible for luminescence were derived from elsewhere. It seems that the dolomitizing fluids, if brackish-water lenses, were horizontally stratified with no vertical interconnection. Even if identical concentrations of trace elements have different types of luminescence in calcite and dolomite an explanation must still be forwarded to explain why in the upper member of the Cape Crauford Formation orange to red luminescent dolostone is vertically interspersed with non-luminescent dolostone. Unfortunately, from the widely spaced sections measured for the present study, the three dimensional nature of these red luminescent dolostones is impossible to determine. A more detailed study would be required. Macroscopically, unit A of the upper member appears homogeneous in the field but this is because of the second generation overprint of pervasive dolomitization. It is likely that the interstratified luminescent and non-luminescent dolomitic zones were formed during the first episode of dolomitization and that the second pervasive episode of dolomitization did not affect the luminescent properties of the dolomite. Pervasive (second generation) dolomitization is easily recognized because ghost texture of former breccia or dolomitic mottles is visible. Not surprisingly, this pervasive dolomitization obliterated many of the earlier formed diagenetic features that presumably were

similar to those that are still preserved in the lower member of the Cape Crauford Formation.

Pervasive Dolomitization of Unit A of the Upper Member of the Cape Crauford Formation

The second major episode of dolomitization occurred after brecciation because cement between breccia clasts as well as the breccia clasts themselves have been dolomitized. In addition, this later episode of dolomitization undoubtedly obliterated many of the early diagenetic features because only the following are of importance in this stratigraphic unit.

1. Spar-filled fractures and vugs with luminescent zonation.
2. Traces of malachite lining spar in vugs.
3. Minor calcification of dolomite.
4. Spar growth along fractures and stylolites.

Dolomitization undoubtedly occurred after complete deposition of unit A of the upper member of the Cape Crauford Formation and rivals the pre-brecciation episode of dolomitization in terms of the volume of rock dolomitized. Parts of the lower member were also pervasively dolomitized, perhaps at the same time as the upper member. Why this second episode of dolomitization was so extensive and yet affected mainly unit A of the upper member of the Cape Crauford Formation is not apparent. Perhaps an unconformity is present between units A and B of the upper member of the Cape Crauford Formation and unit A was subjected to karst-related dolomitization. However, there is no paleontological data to substantiate this concept. In any event, pervasive dolomitization is not considered to be a result of burial because it is so stratigraphically confined. It may be, judging by its pervasive nature, that the residence time of unit A of the upper member of the Cape Crauford Formation in the zone of dolomitization (assumed to be subsurface brackish water lenses) was relatively long. This is reasonable when one considers that the pervasively dolomitized upper part of member B of the Baillarge Formation at Port Bowen was once similar to the relatively impermeable dolomitic mottled limestone of member B elsewhere and to parts of unit A of the upper member of the Cape Crauford Formation. This is assumed because of the same fossil content and ghost dolomitic mottle texture. If this is true, then the dolomitizing fluids

of the second episode of pervasive dolomitization must initially have moved along permeable pathways such as stylolites, dolomitic mottles, joints, bedding planes and fractures. Dolomitization must have occurred initially at the interfaces between fluid and rock at these sites. As dolomitization continued, it created its own permeability and in this way allowed the dolomitizing fluids further access into the rock. Complete dolomitization would therefore have occurred in a step by step fashion from permeable surfaces into the rock. For this reason, this episode of dolomitization is considered to have taken a relatively long time compared with the first episode that produced the dolomitic mottles.

Pervasive Dolomitization In Member A of the Baillarge Formation

Diagenesis above the concordant breccia in member A of the Baillarge Formation includes a later dolomitization episode because high-amplitude stylolites are preserved in the dolostone (units N21 and P7), there is no calcified dolomite and some dolostones have a ghost mottle texture of original dolomitic mottles (e.g., sample N21). This dolomitization is considered here to be karst-related in the manner proposed by Buchbinder *et al.* (1984) because it underlies a major unconformity in which Middle Ordovician strata are missing (G. Nowlan, written comm., 1986; appendix 5). The second pervasive episode of dolomitization involved the transformation of microspar to fine crystalline dolomite and would also have re-dolomitized any remaining calcified dolomite. It is not clear, however, why the second episode of dolomitization was confined to the upper part of member A above the stratified breccia but did not affect the lower part of member A. Perhaps the interval below the breccia was confined to the marine phreatic zone and was therefore removed from the mixing zone of dolomitization.

Dolomitization also occurred below the concordant breccia. One interlaminated clastic dololutite and very fine grained dolarenite has a peculiar patterned appearance (Plate XII.13C) and its originally high permeability (assumed because of its detrital nature) may have been a factor in its complete dolomitization. The lack of relict high-amplitude stylolites in dolostone suggest that dolomitization occurred relatively early. Concentration of dolomite

between the intraclasts of sample N10 as opposed to within intraclasts, similarly implies that dolomitization did not accompany early lithification of the sediment.

Discussion and Choice of a Model for Dolomitization in the Brodeur Group

Unravelling the dolomitization history of the Brodeur Peninsula strata is difficult, given that dolomitization has been a controversial subject since its discovery in the rock record. It was not until 1962 that penecontemporaneous dolomite was recognised in modern sediments (Wells, 1962). Wilson (1975) listed nine ways in which dolomite may be generated in nature but noted that there are problems with attempts to relate dolomitization in modern to those of ancient deposits. For example, many ancient carbonates show early regional dolomitization in open marine sediments while this is not the case for modern sediments (Wilson, 1975). One possible reason for this lack of extensive present-day dolomite is that the kinetics of the process are very slow, involving both dissolution and replacement.

Penecontemporaneous dolomitization in the present-day intertidal-supratidal environment has been recognized in the Persian Gulf, Shark Bay, Western Australia, the Bahamas, Florida Keys, and the Netherlands Antilles. Proposed mechanisms for dolomitization in young sediments include gravity-driven seepage refluxion (Adams and Rhodes, 1960; Deffeyes *et al.*, 1965), capillary concentration (Friedman and Sanders, 1967), and evaporative pumping (Hsu and Siegenthaler, 1969; Hsu and Schneider, 1973). Atwood and Bubb (1970) and Ward and Halley (1985) proposed that dolomitization may occur in waters of near normal marine salinities. Another hypothesis, formulated by Hanshaw *et al.* (1971) and later by Folk and Land (1975), was that dolomitization might be caused by mixing of seawater-derived brines and groundwater. This concept of dolomitization by brackish waters has become known as the "diorag", "schizohaline", or "mixing" model. It has also been suggested that dolomite is an evaporite mineral (Friedman, 1980).

There are advocates who suggest that dolomitization occurs by a combination of these processes (Pierre *et al.*, 1984; Adams, 1986). For example, primary precipitation of dolomite in a sabkha by evaporative concentration of mixed marine and fresh water has been advocated

by Pierre *et al.* (1984). Dolomite is also known to form in ephemeral Australian lakes above the supratidal zone (Muir *et al.*, 1980; von der Borch and Lock, 1979).

Analogues of the mixing model in the rock record have been reported by Badiozamani (1973), Land (1973), Dunham and Olson (1980) and Choquette and Steinen (1980). At present there are few known analogues for ancient dolomitization by seawater of near-normal salinity with the possible exception of Ward and Halley (1985). The problem lies in the definition of the term 'near-normal'. It appears that dolomitization by evaporative pumping (Hsu and Schneider, 1973) is inadequate as a mechanism for explaining regional dolomitization or dolomitization of thick units. The demise of the seepage refluxion hypothesis of Adams and Rhodes (1960) has left geologists groping for an adequate mechanism to explain regional dolomitization of thick rock sequences. There are, however, still advocates for dolomitization by seepage refluxion or modified seepage-refluxion. For example, Adams (1986) believed that dolomitization in the Iroquois Formation of offshore Nova Scotia was probably dolomitized by a combination of seepage refluxion and the mixing of fresh and marine waters.

The notion that mixed marine and meteoric waters may dolomitize rocks may answer the question of how thick units are dolomitized, especially subtidal sediments. Perhaps the answer lies in the term 'penecontemporaneous' because it is generally regarded that the kinetics of dolomitization are extremely slow; during this lag small fluctuations in sealevel on platformal carbonates could result in very pronounced changes in the relative areas of subtidal, intertidal, and supratidal environments as well as the associated subsurface fresh and brackish water lenses. A slight drop in sealevel, for example, might bring previously subtidal deposits into the groundwater-influenced zone of dolomitization. Such fluctuations in sealevel were also considered to result in migration of the mixing zone and dolomitization of the facies K dolomite at Pine Point (Kyle, 1983). Hybrid models of dolomitization involving more than one mechanism are also possible. For example, it is easily conceivable how an already dolomitized zone such as a sabkha crust could be exposed to vadose zone diagenesis by a rise in sealevel. In such a case, the effects of both sabkha and diagenetic dolomitization would be

superimposed. The relative importance of each could conceivably be determined by detailed petrography, supplemented perhaps by stable isotope and trace element geochemical work. Much research remains to be done and it may be some time before universal consensus is reached on even the fundamental problems of the subject.

It is clear, however, that dolomitization of subtidal carbonates containing abundant fossils in which there is no evidence of sabkha cycles or subaerial exposure cannot be attributed to sabkha dolomitization. This is the case for dolomitization in the Brodeur Group and narrows the possibilities to either dolomitization in hypersaline seawater, the penecontemporaneous 'mixing' model or to later burial diagenesis. On Brodeur Peninsula dolomitization of the lower member may be explained by the mixing model. In other members there is also a superimposed later diagenetic pervasive dolomitization, perhaps best exemplified by the Ship Point Formation and unit A of the upper member of the Cape Crauford Formation. This second generation of dolomitization is also attributed to the mixing model.

D. CALCIFICATION OF DOLOMITE AND LEACHING OF CARBONATE

Terminology

Although the term 'dedolomite' and 'dedolomitization' have precedence historically, Smit and Swett (1968) have persuasively argued that the name of the replacement process should be based on the replacing rather than the replaced mineral. Accordingly, they proposed the term 'calcitization' for the 'calcite-after-dolomite' replacement process. The term 'calcitization', however, also refers to the transformation of aragonite to calcite (Lippmann, 1973).

Furthermore, in the experiments of de Groot (1967) aragonite was formed rather than calcite, a process that should more properly be called 'aragonitization' by extension of the arguments of Smit and Swett (1969). Presumably, this aragonite would be pseudomorphous after dolomite, but because aragonite is metastable at near surface conditions and inverts quickly to calcite this intermediate stage could normally be included in the term calcitization.

Where aragonite is leached prior to inversion to calcite (and this may be common according to Evamy, 1967), reference to 'leached calcitized dolomite' would be misleading. In the present study there is abundant evidence for the selective dissolution of calcified dolomite over original calcite. In many thin sections calcified dolomite grades laterally into patchy more porous areas where from textural relations it is clear that calcified dolomite has dissolved. Because aragonite is known to be more soluble than calcite (Lippmann, 1973) it is considered as a possible intermediate product in the calcification process. Katz (1968) noted that calcification affected only calcian dolomites in Jurassic to Turonian rocks in Israel and Lippmann (1973, p. 166) suggested "...that calcian dolomites above a certain excess of calcium are even more soluble than calcite." Textural relations in the samples from Brodeur Peninsula imply replacement of dolomite by aragonite or calcite rather than dissolution of unreplaced dolomite. Aragonite could be tested for in thin section by means of Feigl's solution (Friedman, 1971) or by x-ray methods. It is possible, therefore that dolomite may be replaced by aragonite and then leached prior to inversion to more stable calcite. Alternatively, dolomite may be replaced by more soluble high magnesian calcite (Al-Hashimi and Hemingway, 1973) which similarly does not allow iron in its crystal structure. To avoid potential misinterpretation, the term 'calcified' rather than 'calcitized' is used in the present study and for the sake of consistency, the term calcified is used throughout, not just with reference to leaching.

Calcification in Other Areas

Calcification of dolomite, like dolomitization has been a controversial subject in geology since its discovery in the rock record by Von Morlot in 1847 (*in Shearman et al.*, 1961). Since the early recognition that calcified dolomite is commonly associated with evaporite minerals, it has been suggested that calcium sulphate-rich solutions react with dolomite to produce calcite and magnesian carbonate (Shearman *et al.*, 1961; Evamy, 1963; Goldberg, 1967; Folkman, 1969). Calcified dolomite has been observed in cements in evaporite solution breccias (Moore, 1971) and in non-evaporitic strata below unconformities (Schmidt,

1965; Goldberg, 1967, Braun and Friedman, 1970; Scholle, 1971). Calcified dolomite has also been observed in carbonate solution breccias (Gillett, 1983), in surface-weathered samples (Mossler, 1971; Chafetz, 1972) and in a fresh-water zone along a fault system (Longman and Mench, 1978). It has also been reported from the 'mixing zone' by Magaritz and Kafri (1981) and as a burial diagenetic product (Budai *et al.*, 1984; Al-Hashimi, 1982). According to experiments by de Groot (1967), calcification of dolomite does not occur at temperatures above 60°C. This is at odds with Budai *et al.* (1984), who, citing the work of Kastner (1982), claimed that calcification of dolomite could form at temperatures up to 200°C. However, Kastner (1982) states that this 200°C temperature refers to dolomitization, not calcification. Nevertheless, more experimental work needs to be done to re-evaluate the rather low temperature requirement obtained by de Groot (1967), especially in light of the geological evidence presented by Budai *et al.* (1984) that calcification of dolomite may occur at a depth of several kilometres.

Frank (1981) observed that the most ferroan dolomites were the most easily calcified, yet the calcite replacing dolomite was non-ferroan with iron concentrated as zones of iron oxide inclusions. Evamy (1963) proposed that during calcification of dolomite, iron in dolomite in excess of what can be incorporated in the calcite lattice is oxidized and precipitated as colloidal ferric hydroxide. All the dolomites studied by Frank (1981), however, contained less than 5 mole percent ferroan carbonate, and this is in the 5-10 mole percent range of ferroan carbonate that can be included in the calcite structure (Deer *et al.*, 1966). This situation may be explained if aragonite rather than calcite initially replaced the dolomite because iron occurs in aragonite in only trace amounts (Lippman, 1973).

Criteria for Recognizing Calcified Dolomite

The many textures of calcified dolomite have been well documented in the literature. Shearman *et al.* (1961), Lucia (1961) and Folkman (1969) recognized the following calcification textures:

1. Dolomite crystals replaced by a finer crystalline mosaic of calcite crystals (composite

calcite).

2. Dolomite replaced by a coarser crystalline mosaic.
3. Dolomite crystal ghosts in a new generation of calcite.
4. Transitions both laterally and vertically from a dolomitic to a calcitic rock.

Although microspar or spar after dolomite occurs in about 20 percent of the Brodeur Peninsula samples, significant amounts are present in relatively few (Plate XII.34D and E). Calcified dolomite occurs throughout the Brodeur Group except in pervasively dolomitized units. The depth to which calcification occurs below unconformities is undoubtedly related to permeability. Composite microspar after dolomite usually replaces either the edges or cores of crystals but rarely replaces entire dolomite crystals (Plate XII.39F). The cores of some of the dolomite rhombs are of a composition more readily susceptible to calcification. In sample N5 (Plate XII.40D-F), for example, fluorescent and luminescent cores have been preferentially calcified.

Calcification of Dolomitic Mottles on Brodeur Peninsula

Many of the dolomitic mottles in member B of the Baillarge Formation have been calcified (samples L5e, 7f, h, i, n and O1) and though the mottle texture remains, dolomite of the original dolomitic mottles is replaced by microspar in a manner similar to that described by Shearman *et al.* (1961). Sample O1, taken from the top of the Baillarge Formation adjacent to the breccia pipe in unbrecciated rock contains both dolomite and calcified dolomitic mottles. It is inferred from comparison of the brecciated and unbrecciated adjacent samples that calcifying fluids entered the rock along stylolites and that upon brecciation the enhanced fracture permeability permitted more extensive calcification. These data suggest that calcification occurred prior to brecciation but also continued as brecciation proceeded. Former dolomite crystal ghosts in the calcified dolomitic mottles are masked because the crystals of dolomite were close together and the 'matrix' between the former dolomite crystals was (in this case original) microspar.

Calcified dolomite is most easily recognised in large dolomite crystals, especially where cores of dolomite crystals are selectively replaced by microspar or spar. Where dolomite crystals were originally rhombic in shape and evenly dispersed, and were replaced by microspar, calcified dolomite is distinguishable from surrounding original microspar by its clarity. This clarity is probably a function of the intergrown non-porous nature of the microsparitic (calcified) dolomite. Original microspar, on the other hand, appears darker because higher intercrystalline porosity absorbs much of the transmitted light by reflection and refraction between the many individual crystals comprising the thin section. It is difficult or impossible to recognise in the fine crystalline dolomites where entire dolomite crystals are replaced. In the case of calcified dolomitic mottles, for example, calcification is established not by recognition of individual crystals of calcified dolomite, but by the macroscopic bleached ghost texture of former dolomitic mottles. Fine to medium crystalline dolomite, which is concentrated in mottles in sample E47 has been extensively calcified; in addition, the lath-shaped dolomite between mottles has been partly replaced by microspar.

Calcification in Breccias and Subsequent Leaching on Brodeur Peninsula

The association of calcified dolomite, leached calcified dolomite and breccia (e.g., units A88, D19 and Plate XII.34A-F) is not fortuitous. Leaching of calcified dolomite contributed to brecciation, but only in a few cases is it possibly the only cause. Of all the calcite leached in the Brodeur Peninsula samples, calcified dolomite has been leached in preference to original calcite. Preferential leaching of calcified dolomite has been observed elsewhere by Evamy (1967) who proposed that the initial replacement of dolomite might be high magnesian calcite or aragonite. He even reasoned that the selective leaching of calcified dolomite could produce cavernous rock or even collapse breccia, and this has certainly been a contribution to brecciation on Brodeur Peninsula.

In some cases, calcification was quite late. For example, calcification of dolomite is confined near spar-filled fractures in sample D6a, suggesting that this calcification occurred after fracturing. This is similar to the fracture-related calcified dolomite described by Budai *et*

al. (1984). However, the association of fractures on Brodeur Peninsula with stylolites formed originally in the shallow subsurface suggest that this calcification, though quite late diagenetically may not be related to deep burial. Because stylolites may form close to surface and fractures may be related to stylolites, the assumption that calcified dolomite associated with these structures is a consequence of burial must be used with caution.

There is also evidence that calcification took place after stylolitization but prior to bitumen emplacement. For example, dolomite, which is extensively calcified in sample E33, is concentrated near stylolites and in mottles. There is also evidence that calcitic cement in vugs was dolomitized and then calcified. For example, spar partly replaces clear fluorescent-zoned dolospar that lines vugs in the fine to medium crystalline dolostone of sample H27. Calcified dolomite is also common in sample A49b, which contains breccia clasts coated with alternating dolomitic and sparitic lamellae (Plate XII.23F). In the microsparitic dolostone crackle breccia of unit C24, calcified dolomite is common as clear spar replacing cores of fine crystalline dolomite rhombs. Near the fractures comprising the crackle breccia, however, cores of calcified dolomite have been leached, undoubtedly contributing to the resultant brecciation. In the rubble breccia of unit C26, spar is common both as cement between dolomite and as calcified dolomite replacing dolomite crystal rims. In some areas where both original spar or calcified dolomite or both are dissolved (Plate XII.34F), the resulting unsupported pore space must have led to collapse and brecciation. There is similar evidence for the dissolution of calcified dolomite in the inversely-graded rubble breccia of unit C29.

In some cases (Plate XII.23D), the breccia clasts may be contorted and there is abundant evidence for leaching of calcified dolomite (Plate XII.29F). The clast rims, however are spar-rich. One way in which these data may be explained is to propose that the clast in Plate XII.23D was first calcified and then leached; leaching was so extensive that the clast was de-lithified, then 'folded' and finally brecciated (Plate XII.29F). Later, spar was introduced between the breccia clasts, cementing and perhaps further calcifying the breccia clast rims (Plate XII.29E). Most of the spar in the present outer spar-rich rims in the breccia clast of Plate XII.23D would then represent the filled moulds of leached calcified dolomite. This

sequence of events, though complicated, is reasonable because clast deformation would have been impossible without deformation of the cemented clast rims as well. More obvious examples of contorted clasts confirm that this mechanism may have been operative (Plate XII.21D). Similar examples of dolostone breccia clasts rimmed with limestone have been reported in the Devonian strata in Wood Buffalo National Park (Park, 1984, p. 246).

The low alteration index of conodonts and an estimated maximum burial depth of less than 7 km for the Brodeur Group of Brodeur Peninsula suggests that the temperatures and pressures were too low for true folding to take place. Rather, delithification by leaching must have produced the structures, some of which are reminiscent of soft sediment deformation (Plate XII.15D). Remarkably, this must also be true for the larger 'pseudo-folds' (Plate XII.20C).

A considerable amount of calcified dolomite is common both in and between the coated breccia clasts of sample E40 (Plates XII.21E and 25C). Dolomite is concentrated along stylolites in this sample, a relation that requires stylolitization and brecciation prior to dolomitization and calcification. Certainly, bitumen migration post-dates brecciation because it occurs preferentially along stylolites (e.g., sample D15) and between breccia clasts (unit D22). There is conflicting evidence, however that some calcification of dolomite preceded chert nodule formation because a ghost texture of calcified dolomite (or perhaps hollow dolomite cores) is present in the chert of sample D26. This chert has been brecciated such that calcification of dolomite must have occurred prior to both chert nodule formation and brecciation.

Meagre evidence in sample D9 suggests that bitumen was emplaced after calcification but before leaching of calcified dolomite (Plate XII.13D). This may therefore be an example of telogenetic leaching, assuming that the bitumen was emplaced at or about the time of maximum burial of the Brodeur Group. It is very common in samples to find calcified dolomite dissolved in the more porous areas (e.g., sample D15a and Plate XII.34F). Leaching of calcified dolomite has produced a partly porous rim inside large dolomite crystals at the boundary between the clear outer margins and the inclusion-rich crystal cores of the dolomite

(sample Q10b). Similar porous rims, as well as hollow dolomite rhombs would be produced if the calcified dolomite in sample D21 (Plate XII.34E) was dissolved.

In most samples where dolomite is corroded there are relict non-porous areas where calcified dolomite remains (e.g., sample E32). It is reasonable to assume, therefore that most of the leached dolomite in fact represents leached calcified dolomite which is even more soluble than original calcite. The highest proportion of leached calcified dolomite occurs near stylolites and fractures in sample E70 and leaching in this sample was undoubtedly sufficient to have caused the crackle brecciation.

VIII. BRECCIAS ON BRODEUR PENINSULA

The breccia bodies, which are most common in the lower member of the Cape Crauford Formation, have various shapes and dimensions. They may be conveniently classified as discordant and concordant breccias.

A. DISCORDANT BRECCIA BODIES

Vertical breccia pipes are up to 100 m high, 20 m wide at the base and 10 m wide at the top (Fig. IV.7 and Plates XII.5A,B, 6A,B, 9A,C, 21A). In the Port Bowen area they are very common (Plate XII.9A) and spectacular collapse structures which may represent paleodolines may be up to 100 m wide and 80 m or more high (Plate XII.4A). The strata are usually truncated abruptly by pipes but in some cases they bend sharply down and can be traced a short distance into the pipes (Plate XII.9A,D). The pipes commonly extend down to a main concordant breccia but isolated breccia pipes that do not bottom in concordant breccia are also present (Plate XII.17A). Some of the pipes and merged pipes extend up to or just below the regional unconformity that forms the contact between the lower and upper members of the Cape Crauford Formation (Plate XII.4A, 5A,B, 9A,C). None of the pipes, however, cross the unconformity. Breccia clasts are usually angular to subangular with shapes ranging from equant to tabular. Some clasts may comprise entire field units and be up to 5 m thick (e.g., Plate XII.20B). The breccia is commonly inversely graded with respect to clast size near the base of some of the pipes and there may also be an upward transition from crackle breccia at the base to mosaic or rubble breccia some distance (usually a metre or so) above the base. There are also small scale collapse structures some of which may represent paleodolines (Plates 7A,B, 9B).

Also present are small scale discordant breccias e.g., Plate XII.20A (referred to here as local breccias) some of which are laterally bounded by subvertical joints (Plate XII.18B).

B. CONCORDANT BRECCIA BODIES

Individual concordant breccias up to 22 m thick are laterally continuous for distances exceeding 5 kilometres, but are not traceable regionally. They are preferentially developed in the most soluble carbonate strata, which in the Brodeur Group is light coloured limestone. The concordant breccias, like the discordant breccias, are commonly inversely graded with respect to clast size. Less commonly, breccia a metre or more thick and comprising fine clasts is overlain by coarse clast breccia (Plate XII.20D,E).

A good example of a concordant breccia in member A of the Baillarge Formation (Figs. IV.3 and H in pocket) is of interest because of its similarity to the breccias of the overlying Cape Crauford Formation. The breccia occurs in pure limestone at section MX and overlies convex-up structures that are about 1 m wide and 20 cm high (Plate XII.16A,B and Fig. H in pocket). The breccia is inversely graded with respect to clast size and stylolites are common throughout. The same interval at section N, about 350 m northeast of section MX differs in significant ways. At section N, crackle breccia overlies hummocky structures, which suggests that convex-up rather than hummocky structures are preferentially developed below rubble breccias. Rock in which convex-up structures are developed (unit MX15) consists of cemented crackle breccia containing very high amplitude (to 6 mm) stylolites. Stylolites are important as sites where carbonate has dissolved, microspar has recrystallized to spar and where subvertical fractures commonly terminate. Another good example of concordant breccia occurs in unit L12 near the top of the Baillarge Formation. The clasts, which are up to 20 cm in size 4 to 5 m above the base of the unit are bounded by stylolites and consist of slightly dolomitic fine crystalline sparite. 'Matrix' comprises fine to medium crystalline sparite. This breccia lithology contrasts with the dolomitic mottled biomicrosparite of the rest of the Baillarge Formation and suggests that a change in lithology is required for extensive brecciation to occur in member B of the Baillarge Formation.

C. OTHER REPORTS OF BRECCIAS IN THE VICINITY OF BRODEUR PENINSULA

Breccias, including carbonate solution breccias, are common in rocks of many ages in the area surrounding Brodeur Peninsula. These provide abundant evidence for a long history of repeated karsting (carbonate solution brecciation) in this area.

Society Cliffs Formation

Olson (1984) described four episodes of karst development in dolostone of the Middle Proterozoic Society Cliffs Formation on Borden Peninsula. Of these, the first was interpreted as an evaporite solution breccia and the rest were attributed to carbonate dissolution (Olson, 1984). Flat-floored channels and collapse structures were also reported in the brecciated Society Cliffs Formation (Olson, 1973).

Ship Point Formation

Breccias have also been described from the Ship Point Formation. For example, a one metre thick solution breccia, consisting of angular dolostone and limestone fragments in a fibrous hydromagnesite matrix/cement was recorded at the top of the formation on Borden Peninsula (Trettin, 1969). About 100 km east of Arctic Bay (Fig. 1.1) a light red to yellowish-brown weathering vuggy breccia was reported in the upper 6 m of the Ship Point Formation (Trettin, 1969). Dolostone, dolomitic quartzose sandstone, and chert clasts were observed in a dolomitic/calclitic/quartz sand/silt matrix (Trettin, 1969). Near Navy Board Inlet Trettin (1969, p. 23) observed a breccia in the Ship Point Formation that was "...comparable in appearance to the steeply dipping breccias of the Cape Crauford Formation."; he proposed that this breccia represented "...the filling of a fracture or sink-hole of Middle Ordovician age."

Solution breccias, coated grains and calcified dolomite were also commonly reported throughout the quartzose sandstone and sandy dolostone of member A of the Ship Point Formation 600 km southeast of Cape Crauford (Trettin, 1975). Solution cavities containing silt to very coarse sand in the uppermost 2 m of the formation were thought by Trettin

(1975) to signify a paleokarst surface formed during parts of Porterfieldian and/or Wildernessian time. Further, Trettin noted that the breccias were associated with stylolites, and argillaceous solution zones were very common in conglomeratic and cross-stratified units. Breccias were reported in fossiliferous, unfossiliferous, and thick mottled dolostones and coated grains were encountered in or near many of the brecciated zones (Trettin, 1975).

Thumb Mountain Formation

On southern Devon Island between Radstock Bay and Maxwell Bay angular vugs and some breccia was observed in a limestone and dolostone unit about 16 m below the top of the Thumb Mountain Formation (*in* Miall and Harding, 1971). In the Cornwallis Island-Little Cornwallis Island area (Fig. 1.1), all lead-zinc deposits, including the Polaris deposit, occur in brecciated dolostone of the Thumb Mountain Formation (Kerr, 1977).

D. BRECCIAS AND RELATED STRUCTURES OF THE BRODEUR GROUP

Introduction

On northeastern Somerset Island about 70 km west of Brodeur Peninsula, evaporites were deposited in a sabkha environment (Reinson, 1978). These strata were considered equivalent to the Cape Crauford Formation on Brodeur Peninsula (then referred to the Read Bay Formation) by Norris (1963) and Trettin (1969). Later, the evaporitic strata on Somerset Island were referred to the Cape Crauford Formation by Mayr (1975, 1978), Miall and Kerr (1977, 1980) and others. However, the lower member of the Cape Crauford Formation on Brodeur Peninsula, which contains most of the breccia is correlated here with non-evaporitic strata in the Garnier borehole. The Cape Crauford Formation of Brodeur Peninsula, especially the lower part of the lower member contains a diverse marine fauna (Figs. IV.6 and A to I in pocket). This fauna, along with the lack of sabkha cycles is incompatible with the hypothesis that bedded sabkha evaporites were once part of the sequence. There is also no evidence for short-lived restricted lagoonal evaporites such as those envisioned by Beales and

Oldershaw (1969), Norris (1963) and Trettin (1965a, b) argued that the breccias of the Brodeur Group on Brodeur Peninsula were formed by evaporite dissolution, an idea perpetuated by Olson (1984) and Packard (1985). If bedded evaporites were never part of the strata on Brodeur Peninsula then it follows that the breccias cannot be attributed to evaporite dissolution.

Perhaps the best evidence for dissolution of carbonates as opposed to evaporites is apparent from the collapse structure shown in Plate XII.8A which illustrates the 'space-filling' problem that is discussed further in chapter IX. Although displacement of the thick basal limestone unit of the upper member of the Cape Crauford Formation has been downdropped along the left bounding fault of the graben, the fault does not offset the 5 m thick bed about 30 m below the unconformity. This requires that 10 m of strata were removed between 20 and 30 m below the unconformity. An absurdly shaped evaporite body 10 m thick and 30 or 40 m wide would be required to fill this space. It could be suggested that this space was filled by an evaporite lens similar to those which occur on the east coast of Somerset Island (Reinson, 1978). However, constraints imposed by the structure of the graben would require the hypothetical evaporite body to be the same thickness throughout its lateral extent. By contrast, a lens-shaped evaporite body would be reflected by stratal downturn adjacent to the graben and this is not the case (Plate XII.8A). Further, the evaporite body would have to be isolated because such graben structures are rare on Brodeur Peninsula and evaporitic lenses on Somerset Island are not isolated in this way. It is obvious, therefore that carbonates rather than evaporites were removed and the question reduces to not 'whether carbonates have dissolved,' but to 'how they have dissolved'. This is recorded in different types of secondary structures formed as a consequence of either intercrystalline/intergranular leaching or leaching along discrete surfaces.

Between the lower and upper members of the Cape Crauford Formation on Brodeur Peninsula there is an unconformity which developed during a period of subaerial exposure in the Middle to Late Llandoveryan. Significantly, many of the breccia bodies and collapse structures have their upper boundary coincident with or near the unconformity, suggesting

that they were related in some way (Plate XII.7A,B). Such a situation would be consistent with the development of a karst terrain and collapse of strata associated with carbonate dissolution. This interpretation is supported by the presence of secondary dissolution structures with breccias that occur preferentially in the most soluble light coloured carbonates, especially limestone. Further evidence for subaerial exposure includes the occurrence of a solution unconformity (Plate XII.4B), polygonal desiccation cracks and coated grains or coated clasts in the lower member of the Cape Crauford Formation (Fig. IV.7). Also, if the sequence is considered as a whole there is ample evidence for shallowing to the top of the lower member of the Cape Crauford Formation. These are among the criteria associated with subaerial exposure (Kahle, 1978; Esteban and Klappa, 1983).

Secondary Structures and Breccias of Brodeur Peninsula.

Secondary Structures

Secondary sedimentary structures were tabulated for all 597 field units examined on Brodeur Peninsula. These include high-amplitude stylolites (19%), wavy or hummocky structures (26%), convex-up structures (10%), contorted stratification (9%), diagenetic coated grains (3%), slickensides (4%), breccia (including small-scale discordant or local) breccia (30%) and vugs (25%). These statistics by themselves, however, are not particularly informative in terms of the origin of the breccias. The association of these diagenetic structures with breccias, however, is important. All field units containing breccias (including local breccias) contain the following additional structures; high-amplitude stylolites (31%), wavy or hummocky structures (33%), convex-up structures (18%), contorted strata (15%), coated grains or clasts (5%), and slickensides (7%). The total of these exceeds 100% because some breccias contain more than one of these structures. In detail, 35% of all field units contain no secondary structures, 28% contain one, 20% contain 2, 11% contain 3, 4% contain 4, 1% contain 5 and only 0.5% contain all 6. With the exception of diagenetic coated grains, the wavy, hummocky, convex-up and contorted structures are considered to have formed by intercrystalline carbonate dissolution. The mechanism by which they form may be similar to non-seam

pressure solution, which according to Wanless (1979, p. 439)

...occurs in units having no internal structural resistance to stress and insignificant platy insoluble material. The unit will respond to dissolution throughout rather than along selected surfaces.

Solution, rather than pressure-solution may have been more important, at least initially in the Brodeur Group. At first, wavy, hummocky and convex-up structures were interpreted in the field as stromatolites. However, it soon became apparent that they are diagenetic because of their association with contorted structures and breccias, either in the same unit or in the immediately overlying unit (Figs. A to I in pocket). In addition, wavy, hummocky and convex-up structures are commonly associated with contorted structures. For all field units containing wavy, hummocky, and convex-up structures, contorted structures were also present in 12%. One would therefore expect that as a general rule, units having undergone the most dissolution would have the most dissolution structures. This is not necessarily the case because 20% of units containing breccias contain no other secondary sedimentary structure. Similarly, 3% of units contain only high-amplitude stylolites, 7% contain only hummocky structures, and 0.5 and 2% contain unaccompanied convex-up and contorted structures respectively. The lack of associated structures with some of these may be related to poor outcrop conditions and it seems likely that the preservation potential of these structures in rubble breccias is low.

Relation of Secondary Structures to Breccias

Brecciation, like dolomitization occurred to varying extents in the Brodeur Group. All stages from unbrecciated to rubble brecciated strata are preserved in various places such that reconstruction of an idealized brecciation model is possible. On one extreme, unbrecciated strata grade to columnar high-amplitude stylolites with associated subvertical fractures that in turn grade to crackle breccia. This transitional nature, one of the most important distinguishing criteria of carbonate solution breccias has also been documented elsewhere (Park, 1984, p. 246). The more or less equal distribution of fractures in the Brodeur Group contrasts with the distribution of breccias, which occur preferentially in the Cape Crauford Formation. This apparent contradiction is undoubtedly related to original permeability differences. Apparently, member B of the Baillarge Formation was subjected to the same

agents of dissolution as the Cape Crauford Formation but fracturing was arrested early because of its low permeability. The difference between pervasive intercrystalline dissolution in the coarser crystalline rocks of the Cape Crauford Formation and dissolution confined to bedding planes, stylolites, joints and fractures in the relatively impermeable member B of the Baillarge Formation may explain this distribution of breccias and fractures. In crackle breccias the upper and lower contacts of individual clasts are defined by stylolites and clast sides are defined by subvertical fractures. In the next stage of brecciation some of the subvertical fractures grade to subvertical microfaults that offset the stylolites (e.g., sample J74). The transition of crackle to mosaic breccia is accompanied by the transition from subvertical fractures to subvertical microfaults.

The relative amount of residue along clast boundaries is a measure of the relative amount of material dissolved. Typically, stylolites, which form the top and bottom boundaries of clasts are accentuated by more residue than are the clast sides (Plate XII.23A). In sample R10, in which 60% of the clasts are dolostone, stylolites are concentrated in the microsparite to sparite 'matrix' between dolostone 'clasts'. This suggests that stylolites are less well developed in dolostone because of the lower solubility of dolomite compared with calcite. High-amplitude stylolites in dolostone probably formed prior to dolomitization.

In rare examples, breccia clasts containing stylolites have been rotated and new stylolites have formed along the clast boundaries (Plate XII.26B and sample H11). The resultant stylolites inside the clasts meet the clast bounding stylolites at an angle dependent upon the amount of clast rotation. Similarly, intercrystalline leaching close to stylolites is in breccias represented by clasts with leached rims. In the dolostone crackle breccia of sample J21, for example, the outer 5 mm of the breccia clasts are very porous. In samples where calcification has been extensive and leaching of calcified dolomite has formed vugs (sample J21), the boundaries between 'clasts' and 'matrix' are difficult to distinguish. This difficulty arises from the similarity of the 'clast' and 'matrix' starting material as well as subsequent processes such as leaching of calcified dolomite which alters originally sharp clast boundaries (Plate XII.34F). 'Clasts' and 'matrix' are also difficult to distinguish in crackle breccias

(samples R5 and J37). In many cases where breccia 'clasts' and 'matrix' are difficult to separate in ordinary transmitted light (Plate XII.31C), the two may be better separated by their differing luminescent signature (Plate XII.31D). In other cases breccia clasts that appear homogeneous are revealed as composite or extensively altered clasts under luminescence (compare Plate XII.39C and D). The difficulty of distinguishing 'clasts' and 'matrix' is less in mosaic to rubble breccias (Plate XII.15F) such as unit A47, especially where non-carbonate clasts such as polycrystalline quartz are included e.g., Plate XII.22A or where there is a high cement concentration. In some samples (Plates XII.21F, 22B), clasts either contain or are entirely fossils and are therefore easy to differentiate from 'matrix'.

There is also some evidence that dissolution occurred not only between but also inside clasts. In sample L12 (Plate XII.22C) the large dark clast displays what is believed to be a solution microunconformity in which central laminae (considered originally to have been parallel) have dissolved. The originally parallel nature is inferred by the geometry of the clast fractures.

Although stylolitization and brecciation are gradational, stylolitization in some cases apparently continued after brecciation. In sample R8, for example, breccia clasts at the base are truncated by high-amplitude columnar stylolites (Plate XII.23A).

Formation of Brecciated Breccias

A logical extension of the idea that stylolitization may continue in some cases after brecciation is the concept that if this process continued, breccias would be re-brecciated. The complete spectrum should theoretically be possible, from crackle-brecciated crackle breccias to rubble brecciated rubble breccias. In fact, a rare example of a rubble brecciated rubble breccia was observed at Port Bowen (Plate XII.21C). Such multiple breccias in which breccia clasts are themselves composed of breccia clasts have also been observed in evaporite-solution-collapse breccias in Guatemala by Blount and Moore (1969) and in the Presqu'ile dolostone of the Pine Point area (Beales and Oldershaw, 1969). The observed variability of breccias is undoubtedly related to the original thickness, permeability and composition of the strata.

Brecciation in Member B of the Baillarge Formation

Some of the most important breccias from the standpoint of origin are found in the upper part of the Baillarge Formation. For example, the breccia pipe of unit O1 occurs in a thick sequence of fossiliferous, mottled dolomitic limestone (Fig. H in pocket). The breccia clasts are composed of the same fossiliferous dolomitic limestone as is adjacent to the pipe and include or are entirely composed of fossils (Plate XII.21F). In addition, where dolomite concentration in clasts was originally high, leaching of calcified dolomite has resulted in partially dissolved clasts (e.g., sample O1b). Flowstone occurs at the contact between a small breccia pipe and unbrecciated mottled dolomitic limestone about 6 m above the base of unit L14 (Plate XII.21B). Because flowstone was never found lining fractures or joints elsewhere it is assumed that this flowstone lined the wall of a small Early Silurian cave prior to cave collapse. The timing of brecciation is difficult to determine. However, joints lined with subvertical slickensides in unit L7 suggest that dissolution of carbonate continued after joint formation.

Brecciation in the Lower Member of the Cape Crauford Formation

The reason for some breccia pipes not reaching the surface has been explained in an area of evaporite solution collapse structures by Gustavson *et al.* (1982) but the same general principle is applicable for carbonate-solution collapse structures. According to Gustavson *et al.* (1982, p. 559), some sinkholes do not reach the surface

...because as roof material collapses, it breaks up and the many smaller pieces occupy a larger space than the originally undisturbed rock body. In this fashion the void created by salt dissolution can be used up and the upward propagation of collapse never reaches the surface. In this case no sinkhole results, although chimneys filled with collapse breccias may exist in the subsurface.

In the natural stoping process, the width of the collapse decreases upwards such that the breccia pipes are shaped like inverted cones. As a result of the combination of these two processes, the pipes may not reach the buried surface. Breccias and large scale collapse structures are accompanied by a number of small scale dissolution features.

High amplitude stylolites provide direct evidence for the dissolution of limestone. Their highest incidence is in the breccias, a reasonable association because most of the dissolution has occurred in these rocks (Table IV.4). Stylolites are generally considered a pressure-solution phenomenon that form at depth, though there are widely divergent opinions regarding the minimum depth required. Some authors suggest that stylolites may form soon after deposition (Flügel, 1982). In the interpreted cave breccia of Gillett (1983), stylolites were truncated at clast boundaries, suggesting that the stylolites were formed prior to brecciation. It is not clear from their description, however, whether their breccias are interstratal or true paleokarst; consequently, the depth of burial is difficult to determine. Although truncated stylolites at clast boundaries were not observed in clasts in the Brodeur Group, high amplitude stylolites were observed in breccia clasts rotated at right angles to bedding. This similarly argues for a pre-brecciation episode of stylolitization. Because the breccias represent true buried paleokarst and not interstratal paleokarst, stylolitization must have occurred prior to brecciation. In addition, structures similar or identical with stylolites and referred to as slickolites occur in caliche deposits (Reeves, 1976). A slickolite, according to Bates and Jackson (1980, p. 587) "...resembles a slickenside but shows evidence of some solution and the development of incipient asymmetric stylolites oriented parallel to bedding." This description is very similar or identical with the high-amplitude columnar stylolites shown in Plate XII.19B, C and D. In non-brecciated rocks high-amplitude stylolites occur most commonly in limestone. The most important relation, however is that with the exception of dolostone, high-amplitude stylolites are twice as common in light as opposed to dark rocks (Table IV.4). For dolomitic limestone there are almost three times as many light as dark units containing these structures. The opposite trend for dolostone is difficult to explain.

The contrast in occurrence of wavy, hummocky and convex-up structures is even more extreme because there are five times as many of these structures in light limestone and light calcareous dolostone as in the dark coloured equivalents. Moreover, there are three times as many in dolomitic limestone and dolostone as in the dark coloured equivalents.

Contorted stratification includes structures that resemble soft sediment deformation but are interpreted here as dissolution structures. There is some evidence that intercrystalline leaching was extensive enough to de-lithify the rock (Plates XII.21D, 23D). Also included in this category are kink, crenulation and other fold types. There is a significantly higher incidence of contorted stratification in dolostone than in rocks of other compositions. Either limestone containing contorted laminae was more easily dolomitized or there was a superimposed effect such as leaching of calcified dolomite.

Slickensides, which occur most commonly in the light coloured limestone occur on subvertical collapse-associated fault planes and rarely along bedding planes of folded strata. Except in these rare instances their lineation is subvertical.

Small scale discordant or local breccia is consistently more common in light than dark rocks irrespective of composition (Table IV.4). The almost identical occurrence of breccia in limestone and dolostone suggests that although brecciation is referred to as local in any one unit, dissolution of a limestone bed may produce brecciation in an overlying dolostone. If this was solely the case, however, one would expect that there would not be a higher incidence in light compared with dark dolostone. An alternative explanation may be that some of the locally brecciated limestone was subsequently dolomitized. For dolomitic limestone and calcareous dolostone there is a much higher incidence of local breccia in light than dark rocks, which lends support to the concept that light coloured rocks were more easily brecciated and that there was a post brecciation episode of dolomitization. The preferential occurrence of stylolites, hummocky, convex-up, contorted structures and breccias in the light as opposed to dark rocks is undoubtedly related to concentration of the insoluble residue. According to Wanless (1979), limestone containing clay or silt forms wavy solution seams as opposed to high-amplitude stylolites. This may be one of the reasons that high-amplitude stylolites and breccias are preferentially developed in light (residue-poor) as opposed to dark (residue-rich) rocks. It is not clear, however, why hummocky, convex-up and contorted structures are preferentially developed in residue-poor as opposed to residue-rich rocks. It may be that intercrystalline leaching is arrested early due to plugging of pore spaces by insoluble residue.

Vugs are, not surprisingly, most common in the breccias (42% of breccia units) where they occur mainly as clast moulds.

Although the presence or absence of 26 categories of fossils and structures were tabulated for a total of 319 field units from the lower member of the Cape Crauford Formation (Table IV.4), the division into 9 categories results in unreliable statistics for dark calcareous dolostone and dark dolostone. The values in the dark calcareous dolostone class is especially suspect because there is no sample control for 5 of the 9 units. Explaining why the thick dolostone zones are generally lighter in colour includes the possibility that the purest limestones are preferentially dolomitized.

There are some other important relations between colour, spar content and breccia occurrence. Limestone and dolomitic limestone with more than 50% spar is much lighter (6.1 mean) in value than limestone (5.5 mean) or dolomitic limestone (5.2 mean). Of 36 samples that fall in this category 44% are also breccias. These breccias are even lighter in colour (6.6 mean) which suggests that limestone with the least non-carbonate residue is the most easily dissolved and therefore the most easily brecciated. There are many examples in which residue is concentrated between clasts but this is undoubtedly due to concentration by dissolution of carbonate, not transfer of residue toward clast boundaries. While the most obvious evidence for brecciation by the dissolution of carbonate is the association of high-amplitude stylolites with crackle breccias there are other important relations between sedimentary structures and breccias that are less obvious but that may be important to understanding the brecciation process itself.

In particular, the spatial association between irregular, wavy, hummocky and contorted structures with breccias is considered to be important. It is proposed that most of these structures are of diagenetic origin, specifically a result of carbonate dissolution and/or neomorphism. Their variability is best illustrated by considering some specific examples.

In section A (Fig. A in pocket) for example, hummocky and convex-up structures occur in unit A17 only one metre below a 10 cm thick mosaic breccia (unit A18). A similar example occurs for the 5 m thick breccia of unit A67, in which convex-up structures occur

one metre below breccia. The breccia extends down into the laminated unit to various levels to form a hummocky and convex-up contact. These structures occur at the contact between a laminated calcareous dolostone (unit A65) and an overlying massive crackle breccia. The convex-up structures may be of various sizes and may be superimposed on each other (Plate XII.18A). The hummocky structures may also be inversely graded with respect to size in the units. In unit C36, for example, the hummocky structures at the base are small (Plate XII.23E), but grade up to hummocky structures 10 cm long and 3 cm high 2 m above the base (Fig. C in pocket). Six metres above the base of the unit the structures are 2.5 m wide and 0.3 m high. Locally, the unit is brecciated. One of the best examples of a large-scale hummocky contact between breccia and non-breccia is at the base of a 35 m high breccia pipe between units A87 and A88 (Plate XII.17A and Fig. A in pocket). The breccia there extends down to various levels to cross-cut original stratification. Another excellent example in which breccia overlies convex-up structures is shown by units A73 and 74 (Plate XII.19E). In unit A73 planar lamination at the base grades up into progressively higher amplitude convex-up structures and finally into sparite 'clast'-microsparite 'matrix' mosaic to rubble breccia (unit A74). The composition of the rock containing the hummocky structures is sparite, suggesting that formation of the structures was probably accompanied by recrystallization. Differential intercrystalline leaching is probably the main control on formation of the hummocky, convex-up and contorted structures. Another example occurs at the base of a 40 m thick breccia pipe in section B where the basal contact forms hummocks varying from 6 cm wide by 1 cm high to 40 cm wide by 15 cm high. Particularly good examples of convex-up structures to 25 cm wide and at least 10 cm high in dolostone (unit DX7) occur immediately below a 1.5 m thick dolostone clast breccia (unit DX8 and Fig. D in pocket). In this case breccia cross-cuts some of the convex-up laminae and extends down between the convex-up structures. A similar case occurs in unit G29 (Plate XII.17B and Fig. E in pocket) in which convex-up structures to 30 cm wide by 6 cm high occur at the base of a 2 m thick breccia. This last example differs from the others, however in that the convex-up structures are themselves brecciated. In rare cases hummocky structures, local crackle breccia and coated

grains all occur in the same unit (e.g., unit H8 and Fig. F in pocket). Some of the most spectacular convex-up structures are present in unit J18 6 m below a 16 m thick breccia (unit J21 and Fig. G in pocket). The locally overlying breccia extends down into unit J19 to various levels in a manner similar to that for units A87-88 (Plate XII.17A). Hummocky structures also occur locally in units J54 and 55 a metre below a 1.5 m thick breccia (unit J56 and Plate XII.19F). As in several of the other examples the overlying breccia extends down to various levels. Hummocky structures are also locally present between the breccia of unit R7 and the overlying 18 m thick unit R8 breccia (Fig. I in pocket).

Other Evidence

Pyrolusite(?) dendrites were observed in the field on joint faces in a zone of breccia in unit MX14 and on bedding planes in unit MX17 (Fig. H in pocket). Pyrolusite dendrites are common in caves (Hill, 1976), and this close spatial association with breccias points once again to origin of the breccias by carbonate dissolution.

Banded flowstone along subvertical fractures may be quite thick (Plate XII.14A) and furthermore, stylolites are present in flowstone in sample R5, a texture requiring formation of flowstone prior to stylolite formation. This confirms that this flowstone is not modern and suggests that it formed early, in all likelihood in the Silurian.

E. MAINLY POST-BRECCIATION DIAGENESIS OF THE BRECCIAS

Cementation in Breccias

Cementation in breccias is similar in many respects to cementation in vugs and fractures. There is, however a higher diversity of cement types in breccias than in isolated vugs, undoubtedly due to the originally higher permeability of the breccias.

A single spar-filling cement between breccia clasts is the simplest case but is not very common (Plates XII.15E and 22B). However, even in what appears to be a homogeneous cement, luminescence commonly reveals complex zonation. Another exception (sample J46

and Plate XII.23B) contains a uniform dull orange-red luminescent spar 'matrix' between non-luminescent clasts (Plate XII.32D). Isopachous rim calcite cement is also very common coating breccia clasts (Plates XII.26E and XII.38D-F and samples A11b, B1a,20, E75,77, J45,67 and L12). Two-thirds of these cement rims are fluorescent but differ from similar fluorescent isopachous 'cement' around peloids in that they are luminescent as well as fluorescent. Spar cement that lines breccia clasts may therefore be deceptively homogeneous in transmitted ordinary light (Plate XII.30F) compared with their luminescence (Plate XII.30G) or fluorescence (Plate XII.30H) of the same area. Bright luminescent zones (Plate XII.30H) are commonly matched by white fluorescent zones, suggesting that trace elements rather than organic matter are responsible for their fluorescence. The relation between luminescence and fluorescence is not always this straight forward because bright luminescent zones may not correspond with bright fluorescent zones (compare Plate XII.38A,B and C). Some breccia clasts, which consist mainly of microspar, have outer boundaries accentuated by 15 μ m thick residue rims; in addition, bright orange luminescent rims on clasts comprise 35 percent of the sample (Plate XII.26E). Another sample (E40) contains bright orange luminescent spar between clasts and along subvertical fractures.

In some cases breccia clasts appear to be luminescent but upon closer examination it is apparent that only the cement in the intercrystalline pore space of the clasts (which may be extensive in the case of leached breccia clasts) is luminescent (Plates XII.23B, 32C,D and samples J46 and A2). In such cases the breccia clasts were leached and then cemented with luminescent spar. Curiously, cement between the breccia clasts is not luminescent in sample A2.

Coated Breccia Clasts

Coatings on breccia clasts (Plate XII.23F) that are up to 2 cm thick comprise alternating lamellae of medium to coarse crystalline spar and medium crystalline dolomite. A considerable amount of calcified dolomite further complicates this sample and most of the spar displays a multi-fold fluorescent zonation.

Coatings on breccia clasts, as on coated grains, vary considerably in thickness. On dolomitic breccia clasts the coatings are thin and resemble stylolitic residue in some samples (Plate XII.26F). Coatings on breccia clasts that are up to 7 cm in size (Plate XII.26A) may comprise 20% of the rock and consist of microspar and spar in a clotted texture. Dolomite in this sample (E28) occurs mainly between clasts where calcification has been extensive (Plate XII.25C). Coated breccia clasts also occur as a 'lens' in unit E40 (Plates XII.21E and 25C) in which low-amplitude stylolites that are accentuated by thick residue form the clast boundaries. The clasts have a clotted to 'wispy' texture and calcified dolomite is abundant both inside and between clasts. Bright orange luminescent spar cement, on the other hand occurs between clasts and fills subvertical fractures. Coatings on breccia clasts in sample H1 have a polygonal fit with a concentric structure of lamellae defined by inclusion-rich and poor zones (Plate XII.25A, B). Some of these coatings are truncated at the base by high-amplitude stylolites, a texture that requires a post-brecciation origin for the coatings. In outcrop, similar coated clasts occur as lenses (Plate XII.24A and B).

Breccia Clast Moulds and Casts

Vugs are about twice as common in dolomitic as in calcareous rocks, a result that may be directly related to dolomitization. Partial and complete clast moulds (Plate XII.23B), which were obviously formed after brecciation, are lined by luminescent-zoned isopachous rim cement. Alternatively, leached intercrystalline pore space in clasts are filled with luminescent cement (Plate XII.32C and D). One of the most striking examples of clast moulds in unit B1 (Plate XII.23C) shows that these moulds are lined with spar cement displaying luminescent zonation. Obviously, this spar must have been precipitated after dissolution of the breccia clasts.

Spar is preferentially dissolved along stylolites in unit R15 to form vugs to 10 mm in size, an observation that further confirms the relation between dissolution and brecciation. Dissolution after brecciation is exemplified by clast moulds in a number of samples (A39, 39b, 67, DX2 and J46).

Bleaching of Breccia Clasts

This odd diagenetic alteration, in which many of the clasts or parts of clasts are bleached white was observed in only one sample (Plate XII.22D and E), a crackle breccia comprising dark olive-brown breccia clasts consisting of slightly ostracodal pelmicrosparite. The significance of this bleaching is not clear, but similarly bleached clasts were observed by Kyle (1983) in breccias from Ordovician strata in Tennessee.

IX. ORIGIN OF BRECCIAS

A. TYPES AND CHARACTERISTICS OF CARBONATE BRECCIAS

Introduction

Carbonate breccias are formed by a variety of mechanisms, including gravity, tectonics (including cryptoexplosion structures), desiccation, dissolution of soluble minerals, and flowage of evaporites (Table IX.1). Other possible types include brecciation during the transformation of gypsum to anhydrite and lesser understood hydrothermally-related mechanisms such as hydrofracturing and the force of crystallization of hydrothermally introduced minerals. With the exception of some tectonic breccias, more than one of these mechanisms are normally involved.

Genetic classifications of breccias have been difficult to erect because of the complexity of the mechanisms coupled with the fact that similar breccias may be produced by different mechanisms. These problems are exacerbated by a number of logistical problems such as size and accessibility of exposures. For these reasons the main breccia types are briefly discussed prior to considering the origin of the Brodeur Group breccias.

Tectonic Breccias

In addition to brecciation by localized tectonics, regional tectonic movements may also produce breccias, though the relations may be relatively obscure. For example, Sheehan (1986) described an internal breccia filling fractures formed by subsidence at a Silurian carbonate shelf margin. On Brodeur Peninsula there are only rare examples of high-angle normal or reverse faults and these are not associated with breccias. Thrust faults are a possibility between major stratigraphic units in the Brodeur Group in light of the hypothesis forwarded by Okulitch *et al.* (1986) but detailed evidence in each unit suggests only vertical movement associated with collapse. Large scale thrusting is not excluded as a possibility, but if it occurred it did not contribute to brecciation except possibly at the thrust fault contact.

TERM	REFERENCE	USAGE
Tectonic Breccia	Bates and Jackson (1980)	Breccia formed as a result of crustal movements, usually developed from brittle rocks. Includes fault, fold and crush breccias.
Cryptoexplosion Breccia	Bates and Jackson (1980)	Breccias associated with geoblemes and astroblemes.
Deslocation Breccia	Wilson and Jordan (1983)	Formed by deslocation at the top of major shoaling cycles.
Caliche Breccia	Reeves (1976), Harrison and Steinen (1978), Netterberg (1980), Esteban and Klappa (1983)	Relatively rare in caliche profiles where they are generally crackle to mosaic breccias. Clasts may be up to several centimetres in size, angular to subrounded and commonly occur in a pelmicrite matrix. The clasts are commonly coated with a laminated rind or crust.
Sea-Cliff Collapse Breccia	Inden and Moore (1983), Jones and Ng (in press)	Formed by the collapse of sea cliffs, distinguished by its wedge shape and distinct asymmetry with strata on three sides different from that on the fourth side. Clasts in the breccia are compositionally related to bedded strata of the cliff face.
Subaerial Breccia	Shultz (1984)	Formed in talus slopes and debris flows.
Submarine Breccia	Bros and Moore (1983), Cook and Mullins (1983), Krause and Oldershaw (1979), Hiscott and James (1985)	Includes fore-reef slope talus breccias, slides and slumps and various types of sediment gravity flow breccias in a basin margin environment.
Pseudobreccia	Bathurst (1959), Blount and Moore (1969)	A rock that resembles breccia but is entirely diagenetic. It is easily distinguished by the highly irregular 'clast' shapes and by a gradational boundary between 'clasts' and 'matrix'.
Hydrothermally-Formed Breccia	MacQueen and Thompson (1978), Sawkings (1969)	Breccias formed by hydraulic fracturing, hydrothermally-aided dissolution or by the force of crystallization of introduced crystalline material.
Carbonate and Evaporite Solution Breccia	see Table IX.2	

Table IX.1 Major types of carbonate breccia.

Numerous slickensides were associated with carbonate breccia at the base of thrust sheets in Guatemala where highly fractured round clasts averaging 4 mm in size were observed in a matrix of finely granulated carbonate (Blount and Moore, 1969). Breccia clasts in the Brodeur Group are more angular and slickensides imply only subvertical movements. In addition, regional correlation with Somerset Island and southern Devon Island (Fig. V.1) suggest no repetition of stratigraphic units that would result from thrust faulting.

Cryptoexplosion breccias are of passing interest only in that the Allen Bay Formation is brecciated at the Haughton Astrobleme on western Devon Island (Robertson, 1982; Thorsteinsson and Mayr, 1987).

Desiccation and Caliche Breccias

Examples of desiccation breccias are rare in the Brodeur Group and are associated with desiccation cracks and intraclastic horizons. A study of caliche from Mississippian outcrops of Kentucky showed "...brecciated horizons with subangular to rounded fragments of the host substrate 'floating' in a matrix of brown micritic carbonate..." and "...complex horizons exhibiting multiple episodes of brecciation and lamination..." (Harrison and Steinen, 1978, p. 388). According to Reeves (1976), breccias in caliche are generally rare. In the South African examples described by Netterberg (1980) breccia clasts are commonly coated with a laminated rind and in Texas, caliche boulders and cobbles are commonly covered with a crust of white calcium carbonate (Blank and Tynes, 1965). Breccias in caliche are recognized by the associated diagenetic features of the overall caliche profile, including clotted, alveolar and nodular textures (Esteban and Klappa, 1983). The concordant breccias of Brodeur Peninsula are not caliche breccias because discordant pipes commonly extend down from or near the unconformity separating the upper and lower members of the Cape Crauford Formation to bottom in concordant breccias. This requires that concordant and discordant breccias were formed in the subsurface. In addition, the distinctive diagenetic features of caliche profiles were not observed in the breccias on Brodeur Peninsula.

Submarine Carbonate Breccias

The most common depositional breccias are those formed below water at the shelf/slope break (Table IX.1). They are easily differentiated from solution breccias by their tectonic setting, their overall channel or sheet morphology, and the presence of distinctive sedimentary structures such as graded- or cross-stratification. In addition, depositional breccias do not contain dissolution-related structures such as vertically-confined breccia pipes. Crackle and mosaic breccias are absent in depositional breccias though these may be 'mimicked' where matrix has been removed by stylolitization (Flügel, 1982; Blount and Moore, 1969). Where this has occurred the heterogeneity of clast compositions nevertheless still establishes the depositional nature of the breccia. The Brodeur Group constitutes shelf carbonates deposited hundreds of kilometres southeast of the Silurian shelf/slope break of the Franklinian Geosyncline on Cornwallis Island (Fig. III.1). For all of these reasons, gravity-induced submarine depositional breccias are excluded from further consideration.

Carbonate and Evaporite Solution Breccias

The only remaining breccia types are those formed by the dissolution of soluble minerals, most commonly evaporites or carbonates. Differentiation between these is difficult and has required a detailed study of all aspects of the strata. This difficulty is reflected in the literature where attempts to differentiate between carbonate and evaporite solution breccias have had limited success (Johnston, 1974). Difficulty in differentiating between evaporite and carbonate solution breccias is reflected by a confused genetic terminology (Table IX.2). The term 'paleokarst breccia' in modern usage has been rendered equivalent to the term 'solution breccia', largely because of the change in usage of the term karst. In this regard Quinlan (1972, p. 157) defined karst as "...an aggregate of the characteristic landforms and subsurface features produced primarily as a result of solutional removal of minerals in rock or sediment." He maintained that karst should not be restricted to carbonate terranes as in the classical definition but should include features resulting from the removal of gypsum, anhydrite or halite. In light of this usage, which is followed here, a paleokarst breccia would

<u>TERM</u>	<u>REFERENCE</u>	<u>USAGE</u>
Solution Breccia	Present study	Breccias formed by the dissolution of carbonates, evaporites or other soluble minerals.
Carbonate Solution Breccia	Present study	Breccias formed by the dissolution of carbonate.
Evaporite Solution Breccia	Present study	Breccias formed by the dissolution of evaporite.
Solution Breccia	Monroe (1970)	A mass of rock composed of angular to rounded fragments of rock that have accumulated by dissolution of surrounding or underlying carbonate.
Solution Breccia	Bowles and Braddock (1963), Sando (1974), Wagley et al. (1973)	Used in the sense of 'evaporite solution breccia'.
Collapse Breccia	Monroe (1970)	A mass of rock composed of angular to rounded fragments of limestone or dolomite that has formed as a result of the collapse of the roof of a cave, or of an overhanging ledge.
Solution Collapse Breccia	Clifton (1967)	Used to refer to breccias formed by the dissolution of both evaporite and limestone.
Cave Breccia	Monroe (1970)	Angular fragments of rock forming a fill in a cave, either cemented together by dripstone or in a matrix of cave earth.
Paleokarst Breccia	sensu Quinlan (1972)	A breccia formed by the dissolution of carbonates, 'moderate' evaporites or other soluble minerals. Used in this sense, there is no necessary relation with a former karst surface and the term is synonymous with 'solution breccia' used in the present study. Two types of paleokarst were described by Wright (1982, p. 84) with respect to carbonates: (1) Interstratal or subadjacent paleokarst that forms in the subsurface along lithological boundaries such as unconformities or bedding planes and (2) Buried paleokarst formed below a buried karst surface.

Table IX.2 Terminology of solution breccias in carbonate sequences.

be formed by dissolution of any of these minerals. Used this way, however, the term 'paleokarst' is uninformative with respect to how the breccias were formed, whether by the dissolution of carbonates, evaporites or both. In addition, there is no longer any implied relation to a former erosion surface. To avoid confusion in the present study the terms 'carbonate solution breccia' and 'evaporite solution breccia' are used where appropriate and the term 'solution breccia' is used loosely to refer to breccias formed by the dissolution of any soluble mineral. The term 'evaporite' used here includes not only bedded sulphides and halides but also diagenetic varieties of these minerals.

Evaporite Solution Breccias

The stratigraphic position of breccias relative to significant evaporite deposits remains as one of the most important criteria for recognizing evaporite solution breccias (Blount and Moore, 1969). The important distinguishing criteria of carbonate and evaporite solution breccias, based on a literature survey and the present study is shown in Table IX.3. It is common to find brecciated strata at a stratigraphic position elsewhere occupied by gypsiferous deposits (e.g., Gussow, 1953; Clifton, 1967; Blount and Moore, 1969). Thorsteinsson (1958, p. 37) documented such a case in the Bay Fiord Formation on Cornwallis Island. Evaporite solution breccias have a sharp stratigraphically confined basal contact according to Stanton (1966) and a wide lateral extent (Middleton, 1961; Roberts, 1966).

Indirect evidence for the former presence of bedded anhydrite includes moulds and pseudomorphs of anhydrite near breccias (Beales and Oldershaw, 1969). Clark and Shearman (1980, p. 161) similarly stated that

...recognition of moulds and pseudomorphs after replacement anhydrite in limestones at outcrop can provide a line of corroborative evidence in support of arguments for the former presence of units of bedded anhydrite elsewhere in the succession. These former anhydrite units being inferred at outcrop by dissolution residues, collapse breccias and beds with geodic cavities the shapes of which are reminiscent of anhydrite nodules.

Other indirect evidence for the former presence of evaporites is the association of length-slow chalcedony with evaporites (Pittman and Folk, 1971). Unfortunately, silica in the Brodeur Group is mainly in the form of chert nodules that were observed at 68 sites in the sections measured on Brodeur Peninsula. Only four samples, however, were found to contain

CRITERIA	CARBONATE SOLUTION BRECCIA	EVAPORITE SOLUTION BRECCIA	
		SABKHA	SUBTIDAL EVAPORITES
TECTONIC SETTING	All possible.	Shallow shelf.	Restricted lagoons, basinal to shelf.
DEPOSITIONAL ENVIRONMENT	All possible, but commonly a shallowing up peritidal sequence, not necessarily cyclical.	Cyclical subtidal to supratidal deposits.	Subtidal deposits, formation of evaporites in restricted lagoons may be associated with shallow-water or supratidal conditions.
FOSSILS	Diverse to restricted, no genetic relationship.	Restricted; mainly in subtidal deposits.	Anaerobic benthos and normal marine nekton or fauna rare or absent in deep-water evaporites.
RELATION OF BRECCIAS TO UNCONFORMITIES	Upper boundary of discordant breccias near to or coincident with unconformities in true buried karst. No relation between breccias and unconformities in interstratal paleokarst.	Breccias common at surface but otherwise may not be related to unconformities.	Breccias common at surface but otherwise may not be related to unconformities.
STRATIGRAPHIC RELATION OF BRECCIAS WITH EVAPORITES AT A SIMILAR STRATIGRAPHIC LEVEL ELSEWHERE	Unrelated.	Commonly related.	Commonly related.
SHAPE AND DIMENSIONS OF CONCORDANT BRECCIAS	Variable to sheet-like, laterally continuous for up to tens of kilometres where it is developed in the most soluble carbonate strata.	Entire sequence may be massively brecciated depending on thickness of original evaporites. Solution subsidence without brecciation possible.	Commonly laterally continuous for up to tens of kilometres where evaporites were thick. Solution subsidence without brecciation possible.
SHAPE OF DISCORDANT BRECCIAS AND RELATION TO CONCORDANT BRECCIAS AND UNBRECCIATED STRATA.	Inverted cone shaped breccia pipes to small grabbens that may or may not bottom in concordant breccias. Faults in grabben structures terminate at base of breccia. Basal contact of breccia may cross-cut unbrecciated strata as hummocky or convex-up structures. Strata adjacent to pipe may be flexed down or abruptly truncated.	Discordant breccias possible but basal contacts abrupt; does not cross-cut strata on a scale of a few metres.	Discordant breccias possible; bottom in concordant breccia unless original evaporite beds were thin or solution subsidence occurred without brecciation. Basal contacts abrupt.
INTERNAL CHARACTERISTICS OF BRECCIAS	Inverse-grading of clast-size common, gradual transition from unbrecciated strata at base upward to crackle breccia, mosaic and rubble breccia a few metres above the base of the breccia. Transition from unbrecciated strata to crackle breccia may be a zone of high amplitude stylolites or a zone of hummocky, convex-up or contorted structures.	No upward gradation from unbrecciated strata to crackle breccia and no small scale hummocky, convex-up or contorted structures. Basal contact of breccia does not cross-cut strata, even on a small scale.	As for sabkha.
DISTRIBUTION OF FORMER GYPSUM AND ANHYDRITE	Uniformly distributed pseudomorphs and moulds.	Pseudomorphs and moulds mainly in supratidal deposits.	Pseudomorphs and moulds concentrated near former gypsum and anhydrite beds.
EVIDENCE FOR CARBONATE DISSOLUTION	High-amplitude stylolites common near and in breccias. Truncated stylolites at clast boundaries and high-amplitude stylolites along the bedding of rotated calcareous clasts. Solution thinning is associated with brecciation such that the thinnest zones are the most brecciated. Small-scale joint-bounded breccias and centimetre-sized solution pipes. Leached calcified dolomite common.	High-amplitude stylolites uniformly distributed or concentrated in limestone, not in breccia. Breccia and limestone unrelated. Small-scale joint-bounded breccias and centimetre-sized solution pipes absent. Calcified dolomite common but not leached.	High-amplitude stylolites uniformly distributed or concentrated in limestone, not breccia. Breccia and limestone unrelated. Small-scale joint-bounded breccias and centimetre-sized solution pipes absent. Burial calcified dolomite may be present but not leached.
OTHER EVIDENCE	Fluorite common as pseudomorphs after dolomite. Flowstone coating breccia clasts. Residue within breccia. Moulds of former carbonated breccia clasts commonly accompanied by extensively leached and partially dissolved clasts. Length-fast chalcedony common. No relict evaporites in insoluble residue. No anhydrite nodule-shaped vugs or casts. Paleosol (including terra rossa) or caliche on top of karst. Solution-widened joints filled with green clay. Pyrolusite dendrites associated with breccias.	Fluorite in marginal sabkhas associated with early dolomitization. Flowstone rare or absent. Residue at base of breccia. Moulds of evaporite breccia clasts not associated with extensively leached and partially dissolved carbonate breccia clasts. Relict evaporite breccia clasts rare or absent. Length-slow chalcedony common. Relict evaporite common in residue at base of breccia. Gadic cavities or casts, the shapes of which resemble anhydrite nodules.	Fluorite? Flowstone rare or absent. Residue at base of breccia. Moulds of evaporite breccia clasts not associated with extensively leached and partially dissolved carbonate breccia clasts. Relict evaporite breccia clasts rare or absent. Length-slow chalcedony common. Relict evaporite common in residue at base of breccia. Gadic cavities or casts, the shapes of which resemble anhydrite nodules.

Table IX.3 Main criteria for distinguishing carbonate and evaporite solution breccias.

chalcedony all of which proved to be length-slow (samples C34, E2, G39a and CYS). This meagre evidence, taken by itself is suggestive of the presence of former evaporites. It is of some interest, therefore that sample CYS, taken from scree at section H contains what appear to be anhydrite moulds in chalcedony. It may be, therefore that the length-slow chalcedony was formed in the presence of sulphate-rich solutions of diagenetic origin rather than from bedded evaporites.

In the case of deep-water evaporites, according to the model of Schmalz (1969), the euxinic stage is characterized by anaerobic benthos and normal marine nekton while in the ephemeral stage fauna is rare or absent. Fauna is absent in the permanent evaporite and terminal stages (Schmalz, 1969). Another possible criterion is the recognition of residue from dissolved evaporite beds at the base of breccias. Evaporite solution residues which were described by Smith (1972) from the Permian of England were up to 9 m thick, comprising dolomitic and non-carbonate residues. Where dolomite was absent the residue was only 5 to 10 cm thick and consisted of carbonates, micas, illite, kaolinite, gypsum, quartz and traces of detrital heavy minerals (Smith, 1972). Based on a study of Devonian carbonates in Western Canada, Beales and Oldershaw (1969) proposed that the insoluble residue of evaporite solution breccias may contain gypsum. In addition, evaporites may occur as inclusions in carbonate clasts but not as discrete clasts in the breccia (Clifton, 1967). In the Jurassic rocks of the North Caucasus, however, Sedletsii and Shvedov (1975) observed an evaporite solution breccia that contained rare clasts of anhydrite and was in part cemented by anhydrite.

Subsidiary processes in evaporite solution breccias, according to Stanton (1966), may include brecciation by flowage of evaporites and brecciation by the transformation of gypsum to anhydrite. In cores from the Upper Devonian Leduc Formation Stanton (1966, p. 846) observed that clasts were floating in evaporite, and for this reason proposed that brecciation accompanying the dissolution of evaporites "...does not involve the formation of large voids or caverns followed by foundering of overlying strata." The modifier 'collapse' may be added where there is evidence of former cave formation by the dissolution of any soluble minerals.

Carbonate Solution Breccias

With reference to carbonates Wright (1982) warned that subsurface interstratal dissolution along lithological boundaries such as unconformities or bedding planes can produce features similar to those formed in conjunction with an overlying past land surface i.e., a true buried karst surface. This type of interstratal dissolution in which there is no relation to original topography has been referred to as interstratal paleo- or Recent karst as the case may be. Paleokarst that is related to a former land surface (buried paleokarst) is distinguished from interstratal paleokarst, according to Wright (1982) by recognition of (1) paleosols, (2) truncation by overlying beds, and (3) absence of solution features in beds overlying the paleokarst. Other evidence, such as solution widened joints (Kobluk *et al.*, 1977) is good evidence for carbonate dissolution, but unfortunately may not be preserved.

Although carbonate solution breccias are commonly discordant they may also be concordant and laterally continuous for many kilometres. Based on a study of carbonate breccias in the Ordovician strata in the Newfoundland Zinc Mines at Daniels' Harbour, Newfoundland, Lane (1984) correlated a 30 to 50 cm thick carbonate solution breccia between drillholes a distance of over 10 kilometres. The breccias, which abruptly overlie subtidal dolostones and underlie planar laminated supratidal dolostones were interpreted by Lane (1984) as either syndimentary or early diagenetic. The latter is more in keeping with the conodont data which suggest that the breccias overlie disconformities (*in* Lane, 1984). Lateral continuity was also observed in an interpreted cave breccia in Middle Cambrian limestone in Nevada by Gillett (1983, p. 223) who noted that

This breccia has great lateral extent though its exact stratigraphic position varies. It occurs at both sampled sections..., which are about 25 km apart.

The breccia, which was observed to range vertically through about 50 m, was also observed 30 km to the east and about 30 km to the south (*in* Gillett, 1983). Brecciated beds were correlated on a small scale with unbrecciated laterally equivalent strata a few hundred metres away. The breccias of Nevada, that were described by Gillett (1983) and those of Brodeur Peninsula are similar in that both are underlain by relatively impermeable strata. In Nevada the breccias are underlain by shale and siltstone of the Carrara Formation which were thought to be aquicludes by Gillett (1983), forcing groundwater to move laterally above them.

Similarly, member B of the Baillarge Formation would have behaved as an aquiclude to the overlying lower member of the Cape Crauford Formation where most of the brecciation has occurred. Some of the individual criteria in Table IX.3 are themselves not sufficient for effective discrimination between the various types of solution breccia, but by examining all of the criteria it is possible to differentiate between them.

Combined Effects of Both Carbonate and Evaporite Dissolution:

A very difficult problem would be presented where both evaporites and carbonates were dissolved in the same strata. This is echoed by Smith (1972, p. 264) who stated that "... where total or partial solution of an interbedded carbonate-sulphate sequence has occurred, the relative contribution of the solution of carbonate beds to the total description is probably impossible to determine." Unfortunately, dissolution of carbonate accompanying evaporite dissolution may be fairly common. For example, in the evaporite solution breccias studied by Clifton (1967, p. 829) "The irregular shape of the fragments and their stylolitic surfaces attest to partial solution of the clasts." and (p. 830) "Solution and weathering of the limestone caused further brecciation and produced filled sink structures in the laminated limestone underlying the breccia." Roberts (1966) compared buried carbonate karst and evaporite solution breccias in the Mississippian Madison Group and observed that:

1. The upper and lower surfaces of the buried carbonate karst breccias and the upper surface of the evaporite-solution breccias are poorly defined and stratigraphically discordant.
2. The lower surface of the evaporite solution breccia beds is stratigraphically well defined, sharp and laterally continuous.
3. The carbonate solution breccias of buried karst origin are laterally discontinuous compared with the evaporite solution breccia.

In addition to a confused terminology, the characteristics of carbonate collapse breccias and caliche profiles were undoubtedly different prior to colonization by land plants in the Late Silurian (Esteban and Klappa, 1983). These differences can be expected for the breccias in the Early Ordovician to Early Silurian Ship Point Formation and Brodeur Group. Perhaps the best criterion for distinguishing between evaporite and carbonate solution breccias

is a consequence of the morphology associated with the large graben structures where evaporites are absent from strata adjacent to the grabens. Filling the space necessary to restore the collapsed strata in these grabens (paleodolines) to their former position would require evaporite deposits of absurd geological shapes e.g., cylinders or cubes. This criterion may be conveniently referred to as the space-filling problem. Unfortunately, use of this criterion requires either large outcrops or a high density of subsurface drill cores with at least two readily identifiable horizons, one in the collapsed strata and one at the base of the fault bounded graben.

X. MAINLY POST-BRECCIATION DIAGENESIS

A. PALEOGEOTHERMAL GRADIENT AND DEPTH OF BURIAL IN PRINCE REGENT BASIN

An understanding of the depth of burial of the Brodeur Group and its correlative strata in Prince Regent Basin is important to understanding both organic and inorganic diagenesis associated with burial. A detailed study of organic metamorphism was undertaken by Cooper *et al.* (1974) for the Garnier O-21 borehole who concluded (p. 25) that

A paleogeothermal gradient of 0.67°F per 100 feet [12.2°C/km] is indicated with a surface intercept temperature of approximately 240°F [115.5°C].

If these data are extrapolated linearly upward it can be suggested that about 8.8 km of strata have been eroded from northeastern Somerset Island (assuming an original surface sediment temperature of 10°C). Since strata equivalent to the Brodeur Group occur at a depth of 980 to 1596 m in the Garnier borehole it is possible that up to 10 km of strata have been eroded from Brodeur Peninsula, assuming a similar burial history.

A maximum paleotemperature of 90°C was estimated, however, for the Brodeur Group of Brodeur Peninsula, based on a conodont colour alteration index of one (G. Nowlan, written comm., 1986; appendix 5). Assuming the same 12.2°C paleogeothermal gradient as obtained for the Garnier O-21 borehole and a paleo-surface temperature of 10°C a maximum burial depth of 6.6 km is obtained for the Brodeur Group of northern Brodeur Peninsula. If it is assumed that a similar thickness of Silurian strata was deposited on top of the Brodeur Group as was deposited on its lithostratigraphic equivalent on northeastern Somerset Island, then about one to two kilometres of Silurian strata originally overlay the Brodeur Group on northern Brodeur Peninsula. The remaining 4.6 kilometres of strata, assuming that the maximum burial depth was achieved would then of course have been post-Silurian. The difference between 8.8 km for Somerset Island and 6.6 km for Brodeur Peninsula may be related to uplift on the Melville High or it may not be a significant difference, given the different methods employed in the depth calculations for Somerset Island and Brodeur Peninsula.

B. COATED GRAINS

The distinction between oncolites and coated grains formed syndepositionally from those formed diagenetically is difficult or impossible in some cases. Ancient vadoids have often been mistaken for oncoids (Dunham, 1969). Cross-stratification provides the best evidence for the depositional origin of ooids (e.g., sample C28). Otherwise, textural details of coated grains are highly variable and include coated grains in intraclasts (sample A64b). Also included are spheroidal to ellipsoidal coated grains (200 μm in size) that were dissolved and subsequently filled with chert or dolospar (sample C37). Other samples (D6a and 15a) contain both single- and multi-nucleated coated grains of uncertain origin. Another example is an 8 m thick zone (units G23 to G26) of coated grains (Plate XII.29C,D) that occurs about 25 m below the unconformity that separates the upper and lower members of the Cape Crauford Formation. These coated grains, which are up to 3.6 mm long (modal size 100 μm) consist of alternating dolomitic and calcitic lamellae. Because the dolomite crystals are large and inclusion-rich, a replacement origin is suggested. Brick- and radial-ray texture as described by Asserto and Folk (1976) from Triassic pisolites in Italy was not present. Sedimentary structures were not observed in this thick zone of coated grains, possibly owing to very poor outcrop conditions. One of the samples contains 1% intraclasts to 12 mm long in addition to coated grains. The former presence of gypsum crystals penetrating the coated grains is revealed by bright orange luminescent spar that is pseudomorphic after gypsum. This unit (G23) is capped by a 0.6 m thick pervasively dolomitized pisolitic zone (Plates XII.11E and F). The pisolites are asymmetric, inversely graded and up to 5 mm long. Many have compound nuclei and asymmetric lamellae; some have a length to width ratio of 10 or more. This thick zone of coated grains in unit G24 occurs only 25 m below the unconformity separating the upper and lower members of the Cape Crauford Formation. Although the pisolites are quite large, recent pisolites of depositional origin to 5 mm in size have been reported elsewhere (*in* Simone, 1981, p. 328). However, the reverse graded-bedding and asymmetrical growth is similar to the classical vadolite described by Dunham (1969). Another example of pisolites (sample C46) may also be syndepositional but there is no

cross-stratification to support this contention.

An oncolitic origin for some of the coated grains is another possibility. A good example of a definitive marine oncolite is shown in Plate XII.11D, in which a gastropod forms the nucleus for a thick algal coating. Similar examples have been figured by Tisljar (1983) in the Lower Cretaceous of Yugoslavia. The coating is apparent even though the outer whorls of the gastropod have subsequently been dissolved. Coated grains and coated clasts are rare but occur in all the gross compositional rock types (Table IV.2). The coated grains of sample C42 (Plates XII.26C,D and 31F) are tentatively considered to be diagenetic because very dull orange-red luminescent grains occur in a non-luminescent groundmass. This differs from the mainly non-luminescent marine carbonates of the Cape Crauford Formation. Similarly, the 1 cm-sized coated grains of unit H16 (Plate XII.31E) are probably diagenetic because the coatings are alternately dull orange-red and non-luminescent. In addition, they are similar in asymmetrical growth form and general morphology to the vadoids figured by Peryt (1983). Ostracods form the nuclei for some of the coatings in samples H47, 51 and J70a.

C. FORMATION OF MOULDS AND CASTS

Moulds and Casts of Fossils

Moulds of ostracods (samples A65, D1,1d,13) and brachiopods (unit H25 and samples A94, H34, 42, 78) are almost exclusively the only types of fossil moulds. Why moulds were formed by dissolution of shells of only these phyla is not clear, but presumably, ostracods and brachiopods were the most soluble fossils. Casts of fossils are extremely rare. One good example (sample E61) contains fluorescent clear spar that fills an ostracod mould and nearby irregularly-shaped moulds and vugs of indeterminate origin (Plate XII.36F). Because spar which is fluorescent occurs only in cement, the cast interpretation in this case is assured. Another example (C79) includes an ossicle mould in a chert nodule which is filled with luminescent-zoned dolomite. Although some fossils are luminescent, they are never luminescent-zoned, a texture restricted to cement.

Formation of Pseudomorphs and Moulds of Gypsum and Anhydrite Crystals

Gypsum crystal pseudomorphs and moulds are more common in light than dark rocks (Table IV.2). They occur in about the same proportion in all the gross compositional rock types, including breccias. Gypsum and anhydrite are absent from the strata of northern Brodeur Peninsula though moulds and pseudomorphs of these minerals are present in 22 samples.

The gypsum pseudomorphs, which are up to 5 mm long, commonly have swallowtail terminations (Plate XII.12D) and are normally composed of composite microspar or spar. Crystal size does not increase away from the crystal mould boundaries, suggesting that the pseudomorphs were formed by replacement by microspar/spar rather than by spar filling gypsum crystal moulds.

Spar after gypsum may have thin orange-luminescent overgrowths as in samples A87, C31, 44, 63, D18, 36, 38, DX6, H5 and 22 or it may be uniformly luminescent as in samples B19, C35, E22, 25, 33, 54, 63, 68 and G23. Non-luminescent spar is present only in samples C31d, DX6e, E24, 74, and J74. The pseudomorphs of gypsum are generally present in trace amounts though there are some exceptions (Plates XII.12C, 33D, E and F).

Textural data sometimes provide clues regarding the relative timing of gypsum or anhydrite formation. In the interlaminated dolostone and microsparite of the club-shaped stromatolite of sample C44 (Plate XII.12E), fine crystalline spar occurs after gypsum crystals. It is not clear, however, whether the original gypsum was precipitated syndepositionally or whether it is diagenetic. A peculiar case is gypsum pseudomorphed by composite fluorite in a 'matrix' of microsparite (sample C63). Because fluorite also occurs along stylolites in this sample it seems probable that the gypsum was replaced by fluorite after stylolitization. Unfortunately, it is not clear from this when the original gypsum was formed. Composite microspar after crystals of gypsum to 1 mm in size (some with swallowtail terminations) are both concentrated and truncated along stylolites in sample E74 (Plate XII.30E). This suggests that the gypsum crystals were formed early, prior to stylolitization and perhaps shortly after deposition. This establishes that, at least in this case, gypsum was formed and transformed to

microspar prior to stylolitization. If stylolitization and fracturing are related in this unit, as is the case in so many other units, the formation of gypsum probably occurred at various times both prior to and after stylolitization. An exception is sample G23 (compare Plate XII.29C and D), in which a thin section examined in transmitted ordinary light showed no hint of the former anhydrite revealed by luminescence. Anhydrite, pseudomorphed by orange-luminescent calcite is also concentrated along luminescent spar-filled subvertical fractures in sample E33 (Plate XII.30C and D), suggesting that anhydrite formation occurred at the same time as or after fracturing. In general, the outline of the original gypsum or anhydrite is easily observed in slabs or thin sections.

D. FLUORITE

Traces of blue and purple fluorite were identified in the field in numerous scree samples, in sample H76 and on bedding planes in unit Q20. About 17 percent of all thin sections were also found to contain blue-luminescent fluorite, usually in amounts less than 2%. Although fluorite generally is pseudomorphic after dolomite (Plate XII.29H) it is easily identified by its bright blue luminescence. It is distinguished from similarly blue-luminescent detrital quartz (Plate XII.39E) by its pseudomorphic rhombic form after dolomite. Fluorite occurs throughout the Brodeur Group, but its distribution is irregular both geographically and stratigraphically. Within individual samples blue-luminescent fluorite may be uniformly distributed or it may be distributed preferentially along stylolites (Plate XII.28D-F, samples C23, 63 and H1) or between breccia clasts (Plate XII.29A,B, samples C70, D26 and 28). It is also present along subvertical veinlets (Plate XII.29G, samples C36 and H11) and in coarser crystalline laminae (sample C31e). In general, fluorite is uniformly luminescent, though some of the larger crystals are zoned (samples C23, 25a, and Plate XII.29H). Oddly, it preferentially occurs in ossicles (samples E7a, 12a and I7), dasyclad algae (Plate XII.28G and H) and after gypsum crystals (sample C63).

These textures tentatively suggest that fluorite was emplaced after both stylolitization and brecciation. Fluorite is conspicuously absent in the pervasively dolomitized strata,

especially unit A of the upper member of the Cape Crauford Formation. Presumably, if originally present, it was destroyed during this later dolomitization episode. Fluorite is known to replace dolomite in paleokarstic rocks elsewhere (Buchbinder *et al.*, 1984). It is also known in other deposits, including sabkhas according to Flügel (1982), however, which implies that its presence cannot be used as an indicator of paleokarst.

E. RELICT ORGANIC MATTER, EMPLACEMENT OF BITUMEN AND RELATED DIAGENESIS

Relict organic matter, which is commonly evenly disseminated, comprises a minor proportion of rocks in the Brodeur Group. It is not always evenly distributed, however, and apparently has been redistributed in some samples (Plate XII.36A,B). This may in part be a function of the exclusion of organic matter during the transformation of micrite or microspar to spar because spar-rich areas have a lower organic matter content (Plate XII.40A-C).

Bitumen probably entered the Brodeur Group at about the time of maximum burial, an event which allows the tentative separation of pre- and post-burial diagenesis. Bitumen lines pores along stylolites (samples A40, E5, I2e, J2, 5a), fractures (sample C15), joints (unit F15) and vugs, (samples C20, D1) including corallites (Plate XII.13D) and the space between breccia clasts (A65c, D22 and E75). It also occurs in dolomitic mottles in intercrystalline pores (sample E6), which of course implies that dolomitic mottles were formed prior to maximum burial of the Brodeur Group, assuming that bitumen was emplaced at about that time. It does not fill pores of leached dolomite in unit D9, a constraint that probably requires calcification of dolomite, then emplacement of bitumen, and finally, leaching of the calcified dolomite. If this is true, and admittedly there are only one or two samples in which this texture was observed, then calcification of dolomite continued after burial to several kilometres. An alternative sequence, however, may be bitumen emplacement at depth, calcification, and finally, leaching of the calcified dolomite. Burial related calcification of dolomite has also been documented in the Mississippian Madison Limestone thrust belt by Budai *et al.* (1984).

An orange-luminescent subvertical spar veinlet fills a fracture that passes through a large 'blob' of brittle bitumen in sample A28. Clearly, this spar was not only precipitated after bitumen emplacement but also after fracturing of the bitumen. For fracturing of bitumen to have been possible in the first place, the bitumen would have had to become brittle, probably by devolatilization or by reaction with pore fluids.

F. EVOLUTION OF POROSITY

The evolution of porosity in the Brodeur Group was profoundly affected by karstification in the Early Paleozoic. Not surprisingly, the combination of high interclast and intercrystalline porosity in the breccias has resulted in formation of high porosities, sometimes in excess of 30 percent. Intercrystalline porosity is commonly about 15 to 20 percent in the dolostones, sparites, and brecciated sparites. Furthermore, these relatively high porosities are fairly consistent in unit A of the upper member of the Cape Crauford Formation. The lowest porosities (less than 10 percent) occur in microsparites. Intercrystalline porosities are highly variable in rocks other than dolostones or microsparites but generally range from 5 to 20 percent.

Enhanced intercrystalline porosity along and near stylolites and fractures is quite common in the Brodeur Group (Plate XII.15B) but is extremely variable in degree. The overall porosity may be quite high where leaching of carbonate along and near stylolites is extensive, and where stylolites are vertically close together. This is especially true in the karstified Brodeur Group because the density of stylolites and fractures is much higher than for non-karstified limestones. Intercrystalline porosity, and presumably permeability as well is significantly higher near fractures (e.g., samples A95a, C3, 7, 24, 34, 59a, 66, G36, 40 and 42) and stylolites (e.g., samples D19, E8, 75, G36, 40, 42, 47, H48, L9c, MX11a, 15 and R6).

The combination of subvertical fractures and relatively high porosities would make much of the Cape Crauford Formation an ideal reservoir rock in the subsurface. How far these properties extend in the subsurface away from Brodeur Peninsula, however, is not apparent. Lithostratigraphically equivalent strata in the Garnier O-21 borehole have much

lower porosities, and apparently were never karstified.

G. RARE DIAGENETIC FEATURES

There are a number of rare diagenetic features which, though volumetrically insignificant, are nevertheless important in terms of understanding the major diagenetic events. Some of the diagenetic features were observed in only one or two samples. One of these includes a peculiar asymmetric red luminescent-zoned dolomite that lines vugs (Plate XII.37E). This luminescent zonation is parallel to the boundaries of the vugs irrespective of dolomite rhomb orientation. Mineral fluorescence under blue-violet excitation is white in all thin sections except one in which scalenohedral dolomite cores within rhombic dolomite fluoresce orange (Plate XII.27F).

Another rare diagenetic feature is kink-cleavage which occurs in both corallite walls and in cement which lines collapsed corallite walls. Obviously, spar lining the corallites was precipitated and then kinked during brecciation and collapse. Kinkling in spar was also observed in breccia clasts.

Pyrite

Pyrite occurs as crystal accumulations in vugs and along stylolites in unit H27, samples L2c and MX15b. It also replaces some fossil fragments (sample L2c) and in rare examples, forms a rim inside chert nodules (sample C79a). Very fine crystalline pyrite is also concentrated in the outermost lamellae of some coated grains (sample H16). In sample Q10, vugs after mottles are lined or filled with pyrite crystal accumulations.

Malachite Staining

Malachite staining is most prevalent in breccias and especially in breccia clast moulds. Presumably, the malachite is an insoluble residue remaining after carbonate dissolution. Trace amounts of it were observed in samples B17, C17, 33c, 77, 78, E42a, G4, 7, H62, J46, 71, L5a(?), 8, and 10g.

H. RELATION OF LARGE SCALE DIAGENETIC STRUCTURES TO MICROSCOPIC FEATURES

One important measure of diagenetic alteration related to brecciation is the transformation of microspar to spar. The percentage of spar is generally low in unbrecciated strata, especially in member B of the Baillarge Formation; of 29 samples from the lower 217 m of member B of the Baillarge Formation spar occurs in only 11 samples and in these it is generally present in less than ten percent. The control group of limestone samples which do not contain any secondary sedimentary structures contain an average of 11 percent spar. Much higher sparite proportions are present in the breccias of the Port Bowen-Jackson Inlet area; because these sparites are not associated with cross-stratification they are probably not diagenetically altered calcarenites. Gross features of the rock such as brecciation and convex-up structures are therefore commonly reflected by a high proportion of spar.

I. SUMMARY OF DIAGENESIS IN THE BRODEUR GROUP, BRODEUR PENINSULA

Although about 20 diagenetic processes have been described only a few occur in any one sample. In order to reconstruct the diagenetic history individual diagenetic features must be related in some way. For example, spar filling a fracture that cuts through a bitumen-filled corallite is obviously relatively late diagenetic, assuming that the bitumen emplacement occurred at or near the time of maximum burial. In addition, fracturing occurred after the bitumen became brittle because the fracture transects the bitumen. Unfortunately, such samples are exceedingly rare and most do not provide such fortuitous textural relations. The problem is solved to some extent by making reasonable assumptions and by relating macroscopic to microscopic diagenetic features. The major effects of diagenesis in the Brodeur Group are summarized in Figure X.1 and are briefly reviewed below.

Diagenesis in Member A of the Baillarge Formation

Below the concordant breccia in member A of the Baillarge Formation (Fig. H. in pocket), the effects of diagenesis are reflected by the presence of dolomite, minor calcified

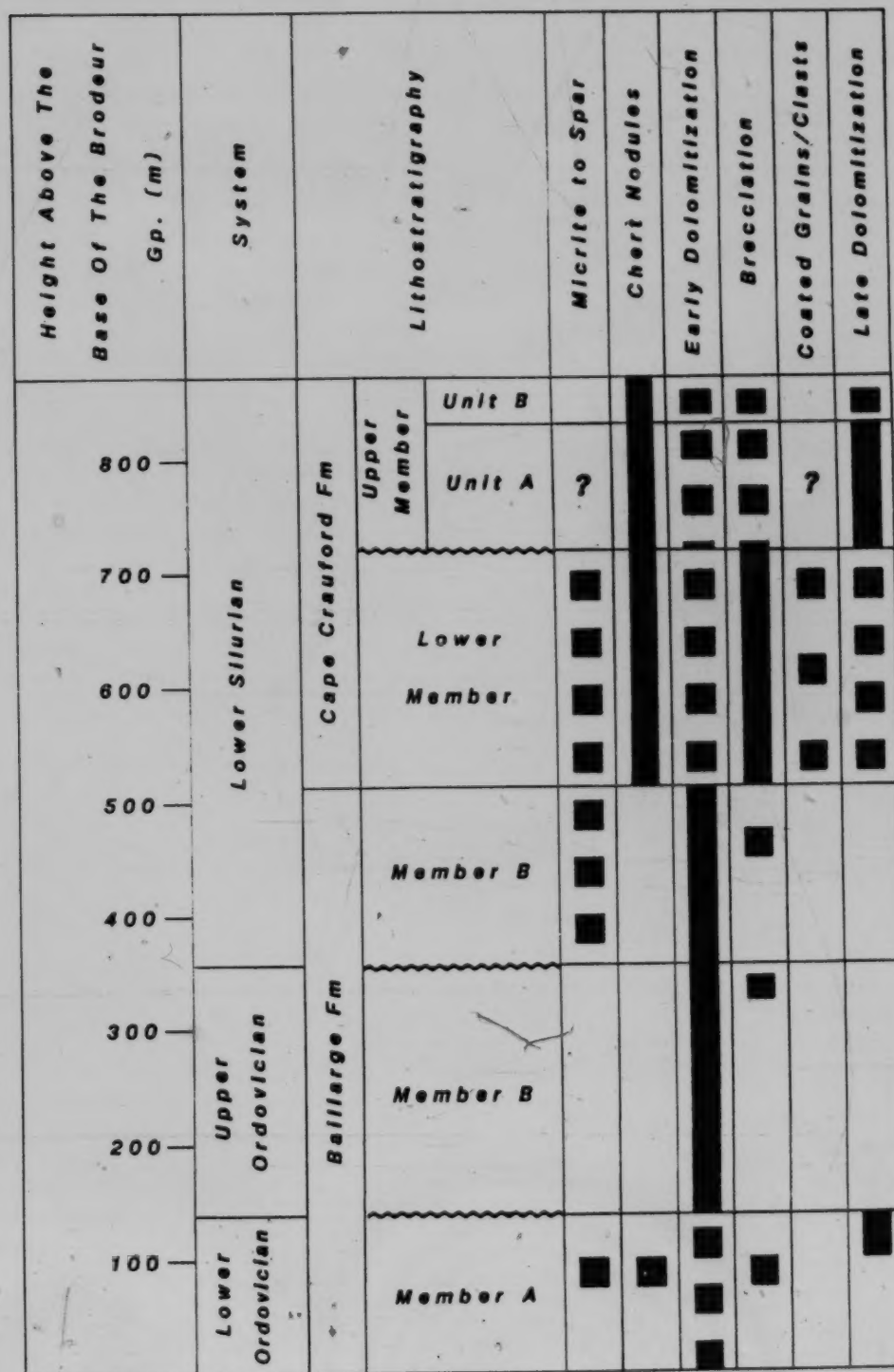


Figure X.1 Major effects of diagenesis in the Brodeur Group, northern Brodeur Peninsula

dolomite, leached calcified dolomite and fractures which terminate at high-amplitude stylolites. Spar is generally present as less than 5% except in the vicinity of or just below the concordant breccia; over 30% spar was observed in one sample. Similarly, chert nodules occur only in the zone of brecciation, suggesting that this was the most permeable zone. The concordant breccia in member A is thin and varies from crackle breccia overlying hummocky structures to inversely-graded rubble breccia overlying convex-up structures. Strata in the interval above the concordant breccia have been pervasively dolomitized such that diagenesis differs markedly from that below the concordant breccia. This pervasive dolomitization may be karst-related because the contact between members A and B of the Baillarge Formation represents a regional unconformity in which almost all Middle Ordovician strata are missing (G. Nowlan, written comm., 1986; appendix 5). Ghost texture of dolomitic mottles, chert nodules and high-amplitude stylolites are among the only diagenetic features. According to Harland *et al.* (1982), this interval spans about 16 million years (468 to 452 Ma). During this period of non-deposition or erosion subaerial exposure and associated karstification may explain the brecciation in member A of the Baillarge Formation.

Diagenesis in Member B of the Baillarge Formation

Diagenesis in the relatively impermeable microsparites of member B of the Baillarge Formation is mainly confined to stylolites, joints and fractures. The effects of diagenesis are recorded as dolomitic mottles, subvertical fractures that terminate at high-amplitude stylolites, and calcified dolomite (rarely as calcified dolomitic mottles). Minor breccia occurs about 32 m below the quartzose siltstone which is believed to coincide with the Ordovician-Silurian boundary 220 m above the base of member B. The Silurian part of member B is characterized by a higher percentage of spar, and samples commonly contain 15% or more spar. Clasts and matrix in the concordant breccia (unit L12) consist almost entirely of spar. One of the only examples of flowstone was observed lining the wall of a breccia pipe in unit O1 (Fig. H in pocket). Because of its low permeability, breccia and dolostone is relatively rare in this member. The lack of permeability is reflected by the distribution of chert nodules, which are

common in all of the Brodeur Group except for member B of the Baillarge Formation, where they are all but absent.

Diagenesis in the Lower Member of the Cape Crauford Formation

In sharp contrast to the relatively impermeable member B of the Baillarge Formation, dolostone in the interbedded variously dolomitic carbonates of the lower member of the Cape Crauford Formation provided the means by which carbonated fresh waters pervaded the more soluble limestone. In addition, limestone is itself commonly coarser grained or more coarsely crystalline in the Cape Crauford Formation than in member B of the Baillarge Formation. It is not surprising, therefore that most of the brecciation occurred in the lower member of the Cape Crauford Formation (Fig. IV.7).

The main diagenetic events in this member are believed to include subtidal cementation and dolomitization of the most permeable strata by subsurface brackish water lenses. This was followed by calcification of dolomite and leaching of the calcified dolomite. Subaerial exposure between the time of deposition of the upper and lower members of the Cape Crauford Formation resulted in vadose diagenesis. Evidence for this includes coated grains and coated clasts in the lower member (Figs. IV.7, X.1). Most of the coated grains, which resemble vadolites occur a few metres below the unconformity separating the upper and lower members of the Cape Crauford Formation. In addition, much of the calcified dolomite and leached calcified dolomite may have formed in the vadose zone at this time. Brecciation in the lower member of the Cape Crauford Formation is extensive, though the unconformity is considered to be entirely intra-Llandoveryan (B.D.E. Chatterton, oral comm., 1986). The Llandoveryan is only about 10 million years long according to Harland *et al.* (1982) which suggests that there are a number of factors unrelated to age which affect the degree of brecciation. These can only be speculated upon at the present time. The second major episode of dolomitization is also considered to have been by brackish water lenses and may be karst-related. This is exemplified by dolomitized coated grains and breccia in which both clasts and matrix have been dolomitized.

Diagenesis in Unit A, Upper Member of the Cape Crauford Formation.

This stratigraphic unit has been pervasively dolomitized to a porous fine to medium crystalline dolostone that is commonly vuggy. Ghost texture of former dolomitic mottles, high-amplitude stylolites and rare breccia attest to the relatively late stage of this dolomitization. Minor calcified dolomite in this unit is therefore still later diagenetic and possibly is associated with burial.

Diagenesis in Unit B, Upper Member of the Cape Crauford Formation.

Diagenesis in this stratigraphic unit, which was only encountered in section H (Fig. F in pocket), includes dolomitization, calcification, leaching and brecciation as well as the formation of chert nodules. Spar content in rock samples commonly exceeds 20% and in this respect this unit is similar to the lower member of the Cape Crauford Formation.

J. DIAGENESIS OF LITHOSTRATIGRAPHIC EQUIVALENTS OF THE BRODEUR GROUP IN THE GARNIER O-21 BOREHOLE

With the exception of two cores, one of which is at the Bay Fiord-Thumb Mountain Formation contact, diagenesis in the Garnier O-21 borehole of Somerset Island can only be studied in drill cuttings. Although no thin sections were prepared from these in the present study, some general conclusions can be drawn regarding diagenesis in lithostratigraphic correlatives of the Brodeur Group on Somerset Island.

Diagenesis of Lithostratigraphic Equivalents of Member B of The Baillarge Formation

The composition of drill cuttings in the Thumb Mountain Formation suggest that dolomitic mottles may be present and that chert nodules are absent in the Thumb Mountain Formation (Appendix 3 and Fig. J in pocket). Chert nodules are also absent from member B of the Baillarge Formation, Brodeur Peninsula and in this respect diagenesis may have been similar in these correlative strata.

Diagenesis of Lithostratigraphic Equivalents of the Lower Member of the Cape Crauford Formation

Only low-amplitude stylolites were observed in drill cuttings from this interval, suggesting that paleokarst was not developed on northeastern Somerset Island (unit A of the carbonate-evaporite sequence). However, because there are trace amounts of chert in the drill cuttings it is quite possible that chert nodules similar to those described from the lower member of the Cape Crauford Formation also occur in unit A in the borehole.

Diagenesis of Equivalents of the Upper Member of the Cape Crauford Formation

Unit A of the upper member of the Cape Crauford Formation is mainly fine to medium crystalline dolostone whereas its lithostratigraphic equivalent (unit B of the carbonate-evaporite sequence in the borehole) is mainly very fine to fine crystalline dolostone. In addition, this interval in the borehole contains minor amounts of gypsum, though some of this is in the form of cement lining fractures in sparite. It is also possible that some or all of the gypsiferous material in unit A represents cavings.

XI. ECONOMIC POTENTIAL OF BRODEUR PENINSULA

A. MINERAL POTENTIAL

A combination of factors makes the area favourable from the standpoint of mineral exploration. Extensive Silurian paleokarst (carbonate solution) breccia is developed beneath a regional unconformity that occurs over an area of at least 5000 square kilometres. This area is situated between the Polaris and Nanisivik mines which have combined lead-zinc ore reserves of over 25 million tonnes (Gibbins, 1982), reserves that occur in solution caverns in carbonate rocks. These mines, together with Pine Point also account for a large proportion of the cadmium and silver produced in the Northwest Territories (Brown and Caine, 1986). They are the familiar Mississippi Valley-type deposits; twelve of the fourteen known deposits of the Cornwallis Lead-Zinc District are found in the upper part of the Thumb Mountain Formation in brecciated dolostone (Kerr, 1977). Mineralisation at the Truro Island and Polaris deposits is believed to have occurred during the Late Devonian at a time when the Silurian paleokarst of Brodeur Peninsula was already developed (Gibbins, 1982). The relation of lead-zinc deposits to paleokarst breccias on Borden Peninsula has been considered by Olson (1984). Late dewatering of the black shale underlying the Society Cliffs Formation was thought by Olson (1984) to be the source of metals for the Mississippi Valley-type zinc-lead sulphide deposits of the Proterozoic Society Cliffs Formation on Borden Peninsula. In sharp contrast with Borden Peninsula, Brodeur Peninsula, has received relatively little attention from the standpoint of mineral exploration. According to Jackson *et al.* (1985, p. 648)

If northwest trending faults have played any part in emplacement of zinc-lead orebodies on Little Cornwallis Island and at Nanisivik, then the intervening Brodeur Peninsula and Somerset Island carbonates should be considered as possible exploration areas.

In the East Tennessee zinc districts ore deposits occur preferentially in the crackle to rubble brecciated dolostones (Wedow, 1971). The breccias, in turn, are situated in areas of maximum solution thinning of underlying limestone. A similar situation was observed by Lane (1984) in Newfoundland where zinc ore was situated in breccias at the margins of structural

depressions formed by collapse. Breccias are therefore a prerequisite control for Mississippi Valley-type ore deposits. Another important control is the presence of a metal or sulphur source. In the Cornwallis Fold belt Kerr (1977) proposed that this source was one or more of the Cape Phillips shale, the underlying evaporitic Bay Fiord or Baumann Fiord formations, or the underlying Precambrian basement. In the Cornwallis Lead-Zinc district Kerr (1977, p. 1424) noted that

The important deposits are in dolomitized limestone, on the flanks or crests of anticlinal culminations up-dip from bituminous shales. They are associated with surfaces of angular unconformity, and normally beneath them."

On Brodeur Peninsula, the highest concentration of breccias are situated along or near the axis of the Melville High (Fig. III.2). The intersection of the axis of the Melville High and the extension of the Borden Basin under Brodeur Peninsula may therefore be a favourable exploration target in light of the potentially larger sources of underlying Proterozoic shale. This shale would probably have been compacted, however by the Silurian.

In addition, over a dozen kimberlite pipes have been located on northern Somerset Island to the west of Brodeur Peninsula according to Mitchell (1976) and 35 to 40 have been found on Borden Peninsula east of the study area (G.D. Mason, Pan Canadian, oral comm., 1984). To date, no kimberlite pipes have been found on Brodeur Peninsula, possibly because of the mantle of Quaternary sediments. Kimberlites on Somerset Island have a positive (500-2000 gamma) magnetic anomaly according to Mitchell (1976) so pipes with similar anomalies should be readily identified by aeromagnetic surveys. The association of diamonds with some kimberlite pipes gives the area some potential in this regard.

During the present study only minor amounts of fluorite and pyrite were encountered, and traces of malachite were commonly observed. The pyrite was most common in vugs in the upper member of the Cape Crauford Formation.

B. PETROLEUM POTENTIAL

Studies by Robertson Research (North America) Ltd. for the Garnier O-21 borehole of northeastern Somerset Island (*in* Anonymous, 1974, p. 3) suggested that

"All results indicate that the section is mature but not organically metamorphosed. The likely product from oil-prone organic matter would be medium to light oil."

Furthermore, according to Cooper *et al.* (1974, p. 28)

The presence of interstitial organic material throughout the sequence and of fluorescent hydrocarbon films at certain intervals within it, indicates that both primary and secondary migration of oil has occurred through the sediments.

In the Brodeur Group of Brodeur Peninsula, some bitumen occurs in the breccias and along joints and fractures, indicating migration after karsting and probably after burial to several kilometres.

According to North (1985, p. 197), nearly all oil in limestone reservoirs is pooled below unconformities where limestone has been leached by meteoric waters during times of regression; examples cited include the Middle East, the Williston Basin and many Mid-Continent fields. This should certainly be considered in future exploration of the area.

XII. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

A. CONCLUSIONS

This study permits the following conclusions:

1. The Brodeur Group is composed of the Baillarge and Cape Crauford formations, a succession of Ordovician-Silurian carbonates deposited in the Franklinian miogeosyncline.
2. The Baillarge Formation is informally divided into two members. Member A, which is of Early Ordovician age, is about 140 m thick and consists of dolostone and variously interstratified carbonates along with rare thin beds of shaley limestone and a thin concordant carbonate solution breccia. The contact between members A and B is a regional unconformity which denotes the omission of Middle Ordovician strata. Member B, which is of Late Ordovician to Early Silurian age, is 374 m thick and consists of fossiliferous, dolomitic mottled limestone. The Ordovician-Silurian boundary is placed, on the basis of conodonts about 220 m above the base of member B. This coincides with evidence for rapid shallowing and subaerial exposure. A concordant carbonate solution breccia is preserved 292 to 310 m above the base of member B.
3. The Early Silurian (Llandoveryan) Cape Crauford Formation overlies the Baillarge Formation and is divided informally into upper and lower members.
4. The lower member of the Cape Crauford Formation is a shallow subtidal sequence consisting of non-cyclic, interstratified, variously dolomitic carbonate. Concordant and discordant carbonate solution breccias are also common. The contact between the lower and upper members is an unconformity of Middle or Late Llandoveryan age. Subaerial exposure is recorded just below this unconformity by desiccation cracks, a solution unconformity, collapse structures and pisolites. The lower member is correlated with non-evaporitic strata in the lowermost part of the carbonate-evaporite sequence in the Garnier O-21 borehole on Somerset Island which is considered a lithofacies equivalent of the basal part of the Allen Bay Formation elsewhere in the Canadian Arctic.
5. The upper member of the Cape Crauford Formation is informally divided into units A and

B. Unit A at the base (110 m) is a distinctive orange-weathering, massive dolostone that is the most mappable unit in the area. It is overlain by unit B, a 42 m thick sequence comprising thin units of variously dolomitic interstratified carbonates, including breccia.

6. Diagenesis in member B of the Baillarge Formation is considerably different from that in the lower member of the Cape Crauford Formation. Member B is relatively impermeable except along bedding planes, stylolites, joints and fractures; this may explain why breccias are rare in this member. On the other hand, the early dolomitized units in the lower member of the Cape Crauford Formation, as well as limestone units are more coarsely crystalline and permeable. At the time of subaerial exposure the more soluble limestone was dissolved at boundaries with the more dolomitic units. In addition, intercrystalline leaching occurred within the calcareous rocks, including the calcified dolostones. This intercrystalline leaching is believed to be responsible for localized delithification and the formation of the hummocky and convex-up structures which are concentrated at the base of the breccia bodies. Diagenesis in unit A of the upper member differs from that in the lower member in that unit A has been pervasively dolomitized. This ghost texture of former dolomitic mottles and breccias suggests that the diagenetic sequence in these units was originally similar.

7. The most important criteria for distinguishing carbonate from evaporite solution breccias are:
- a. Recognition of the depositional environment in which the breccias are found. Carbonate solution breccias are possible in carbonates of all types, but are probably most common in a shallowing-up carbonate sequence capped by an unconformity representing subaerial exposure.
 - b. In carbonate solution breccias there is no necessary stratigraphic relation between breccias and evaporite-bearing strata elsewhere.
 - c. Carbonate solution breccias, if in an interstratified variously dolomitic carbonate sequence, are preferentially developed in limestone.
 - d. The concordant breccias may be tabular in shape, and have a lateral extent of several

- kilometres. Discordant breccias commonly have an inverted conical shape and may bottom in concordant breccias. The basal contact of discordant breccias may coincide or may cross-cut stratigraphic boundaries in an undulatory manner. Such undulatory surfaces would not be expected in breccias formed by dissolution of bedded evaporites.
- e. In carbonate solution breccias clasts may be inversely graded with respect to size and may grade upward from non-brecciated strata with high-amplitude stylolites to crackle, mosaic and finally rubble breccias. In evaporite solution breccias an inverse gradation of clasts is possible, but the upward transition of non-brecciated strata at the base to high-amplitude stylolites and crackle breccias would not be expected.
 - f. Gypsum and anhydrite pseudomorphs and moulds in carbonate solution breccias are uniformly distributed whereas in evaporite solution breccias they are mainly concentrated in the breccia itself.
 - g. In carbonate solution breccias, high amplitude stylolites, permeable limestone and breccias are closely related. In evaporite solution breccias on the other hand, stylolites would be expected to be uniformly distributed rather than concentrated near or in breccias.
 - h. Calcified dolomite is common in both carbonate and evaporite solution breccias, but is never extensively leached in evaporite solution breccias.
 - i. Definitive evidence of a carbonate solution origin such as joint-bounded breccias and small-scale solution pipes are, unfortunately, rare.
- 8. The lead-zinc mineral potential of Brodeur Peninsula is upgraded by the recognition of carbonate-solution- rather than evaporite-solution-breccias.
 - 9. The petroleum potential in surrounding water-covered areas is upgraded by recognition of paleokarst below an Early Silurian unconformity.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

- 1. The stratigraphic correlation of the Brodeur Group on Brodeur Peninsula presented here with strata exposed on southwestern Devon Island should be tested with more detailed work on southwestern Devon Island. Conodont studies should be included in an attempt

to better define the regional time-stratigraphic framework.

2. Many more sections could be measured in the interior of Brodeur Peninsula in river valleys to better define the stratigraphic framework on Brodeur Peninsula.
3. Carbon and oxygen isotope studies could be conducted on the syndepositional, pre- and post-brecciation dolomites in order to shed light on the origin of the various generations of dolomite.
4. Gradations between pure limestone and dolostone are difficult to distinguish in the field. Studies of dolomitization would therefore be greatly aided by taking many small samples every metre or so in the sections.
5. Further refinement of the diagenetic history could be undertaken by more sophisticated analytical techniques such as scanning electron microscope, electron or ion microprobe studies.
6. Identification of macrofossils collected from the Silurian part of the Brodeur Group might further refine the time-stratigraphic framework.
7. Studies of microporosity in thin section could be aided in future by impregnating samples with a fluorescent-dyed epoxy. Penetration of fine pores would be greatly facilitated by use of a low viscosity epoxy such as described by Jim (1985) which sets only when a threshold temperature of 40-60°C is reached. If such an epoxy could be spiked with a fluorescent dye such as described in Yanguas and Dravis (1985), or an opaque dye, reliable studies of microporosity could be undertaken. The problem with ordinary epoxy resins is that they are often too viscous and set too quickly before complete impregnation is achieved.

Plate XII.1

A. Reference section of the Baillarge Formation showing part of member A and most of member B, 28 km southwest of Cape Crauford.

B. The Cape Crauford Formation at section G, Cape Crauford. The contact between the upper (U) and lower (L) members is marked by the black line. Coastal cliff is 340 m high.

C. The Baillarge Formation (B), lower (L) and upper (U) members of the Cape Crauford Formation at Stanley Point (cropped off at the left of the photograph), view is to the southeast with Admiralty Inlet and Borden Peninsula in the far background. Contacts are marked by black lines. Coastal cliff is 310 m high.

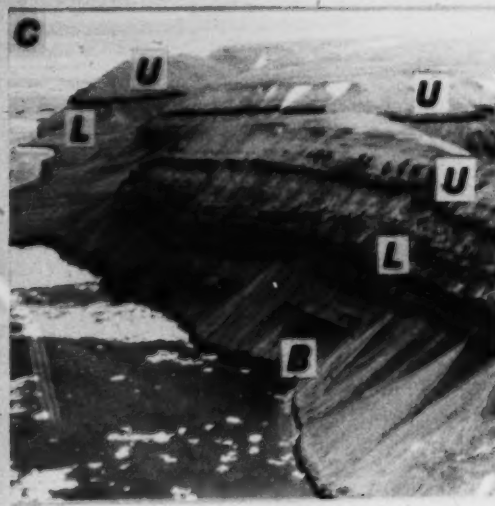
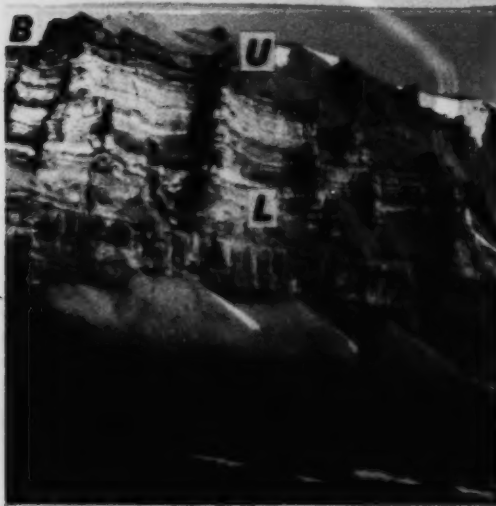
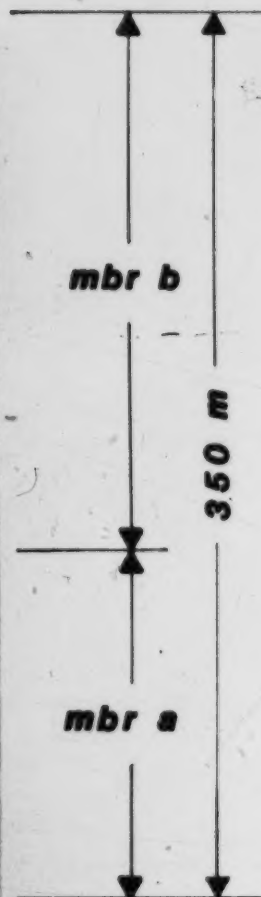


Plate XII.2

A. Lower member (L) of the Cape Crauford Formation at the type locality (section F). Field assistant is on the top of a 'butress' 123 m above the base of the lower member. Upper member (U) is in background.

B. Section J (dotted) measured 19 km west of Stanley Point through the upper part of member B of the Baillarge Formation (B), the lower (L) and upper (U) members of the Cape Crauford Formation. Contacts are marked by black lines.

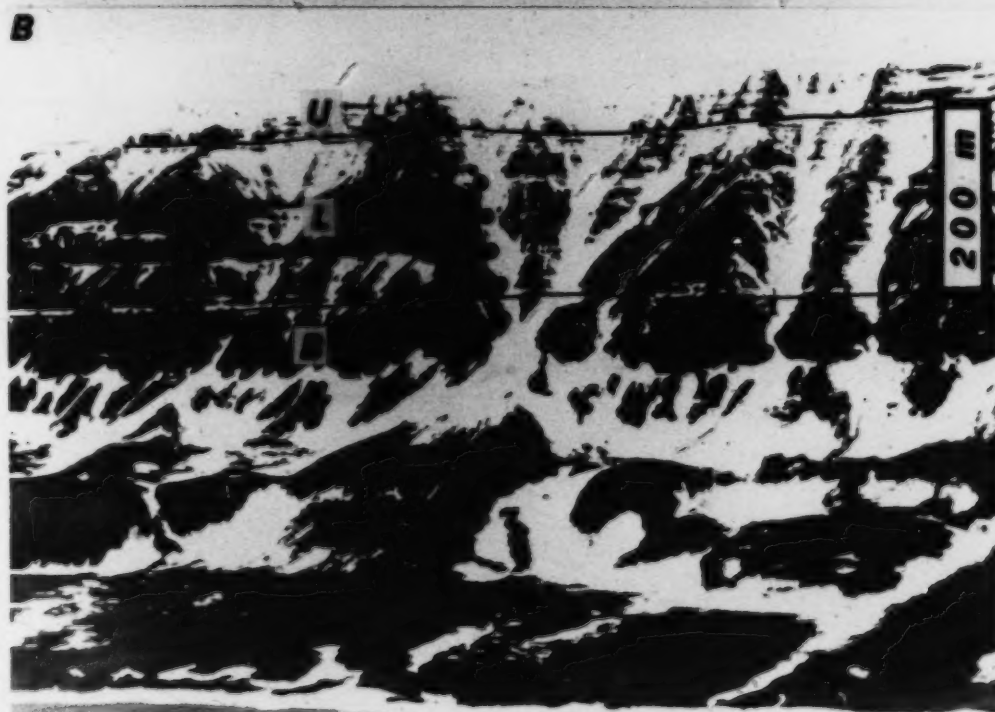
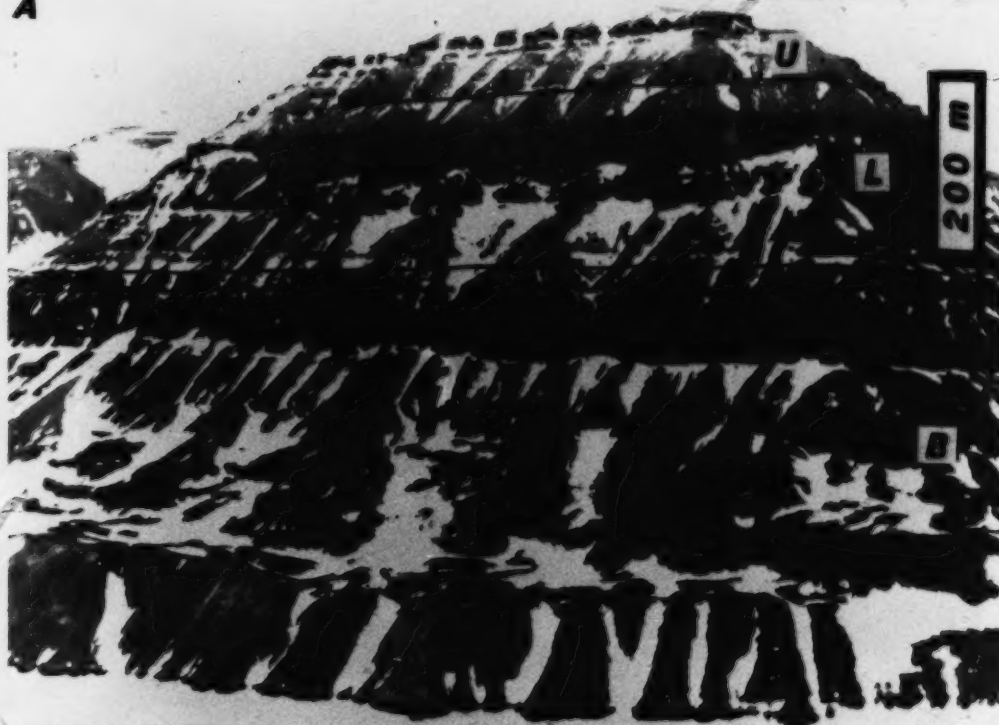


Plate XII.3

A. Brodeur Group in coastal cliff exposures, 9 km east of Sargent Point. The Baillarge Formation (B), the lower (L) and upper (U) members of the Cape Crauford Formation are well exposed in this 550 metre high cliff face. Contacts are marked by black lines.

B. Section H (dotted) measured through the upper part of the lower member (L) and units 'a' and 'b' of the upper member (U) of the Cape Crauford Formation. Coastal cliff exposure, 6 km east of Cape York. Contacts are marked by black lines.

A



B



Plate XII.4

A. A 100 m wide breccia body (a) on the south shore of Port Bowen (outlined) in relatively undisturbed strata (b) of the lower member (L) of the Cape Crauford Formation. The upper member (U) of the Cape Crauford Formation unconformably overlies the lower member and extends undisturbed over this collapse zone.

B. Unit DX12 of the the upper member (U) truncates collapsed strata of unit DX11 of the lower member (L) of the Cape Crauford Formation. The solution unconformity (marked by the black line) is 156 m above the base of the lower member. North shore of Port Bowen.

A



B



Plate XII.5

A. Breccia pipes (a) in the lower member of the Cape Crauford Formation (L). The upper member (U) and the contact (marked by the black line) are also shown.

B. Close-up of pipes (a) shown above in Plate XII.5A. Adjacent strata are also brecciated to varying degrees but stratification is still apparent.

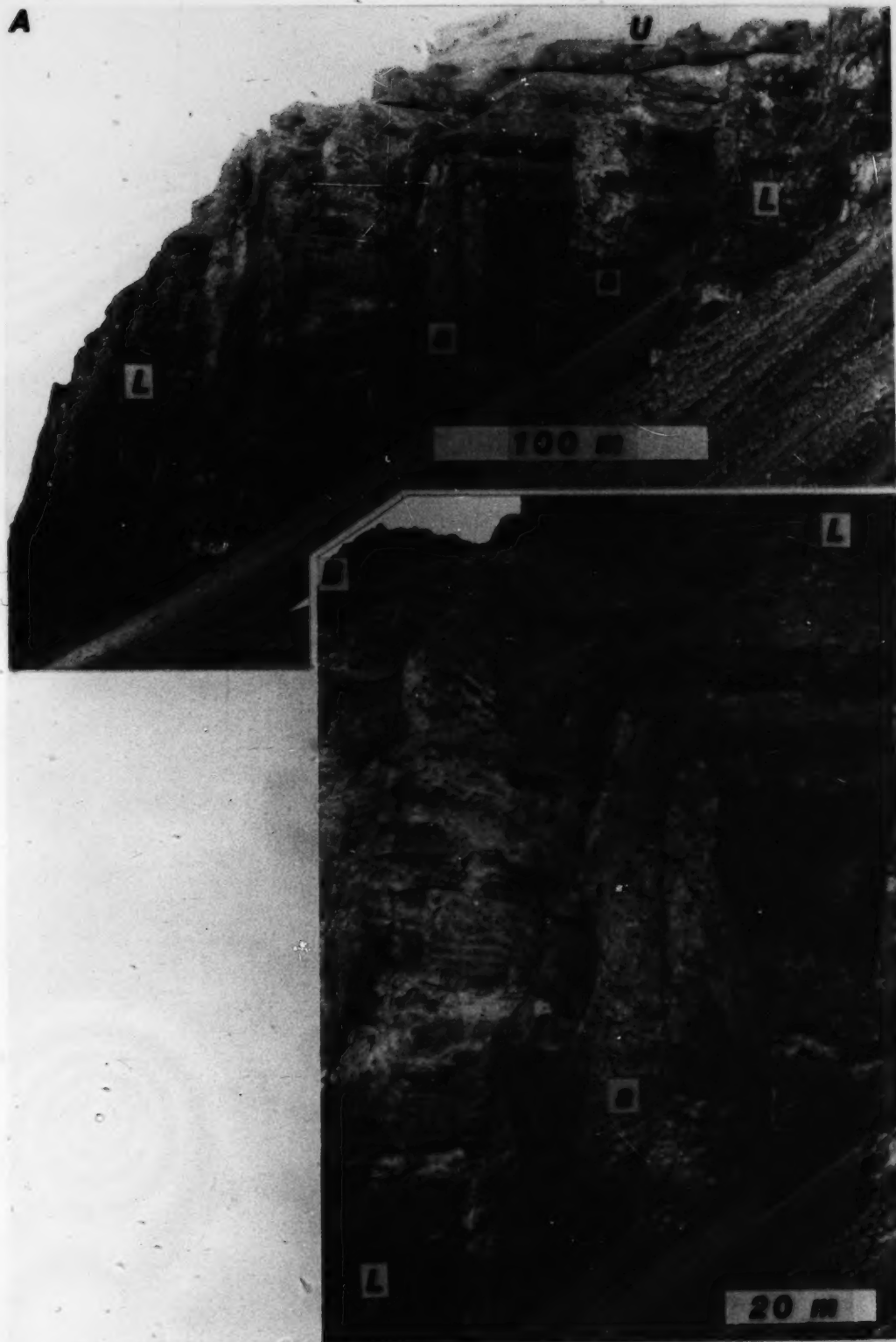
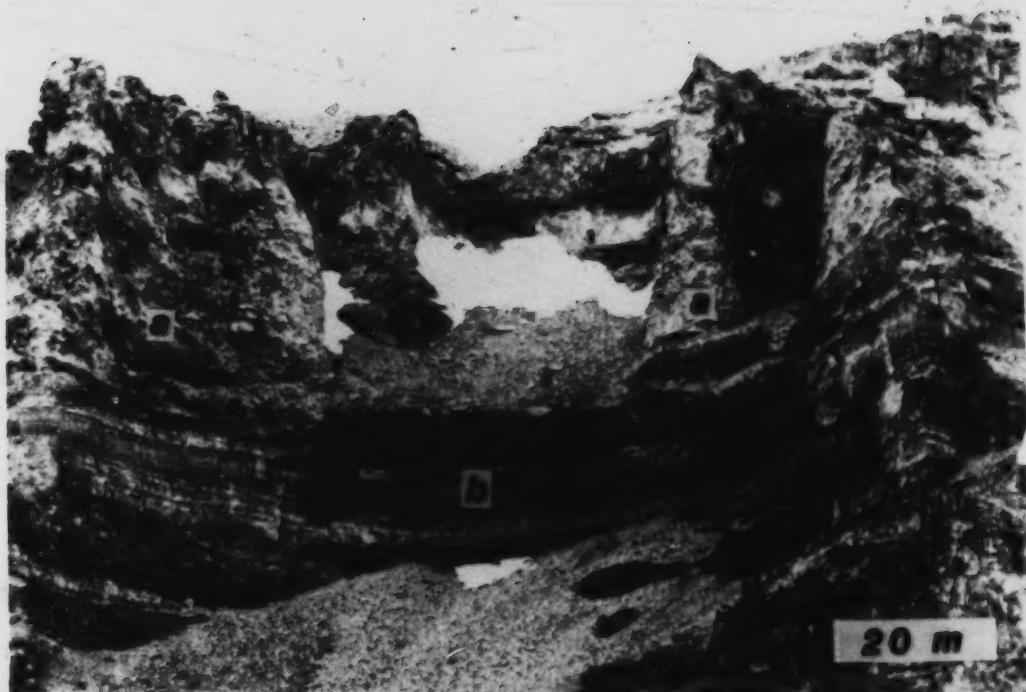


Plate XII.6

A. Local breccia (a) in the upper part of the lower member of the Cape Crauford Formation, overlying unbrecciated strata (b), 5 km southwest of Cape Crauford.

B. Close-up view of local breccia (a) and unbrecciated strata (b).

A



B



Plate XII.7

A. Small collapse structure (a) in the upper part of the lower member (L) of the Cape Crauford Formation, Port Bowen. Undisturbed strata of the upper member (U) pass over the top of the collapse. The collapse structure may represent an Early Silurian sinkhole.

B. Side view of same structure shown in Plate XII.7A. Section TL was measured up the near side of the collapse structure. View is to the west with Port Bowen in the background.

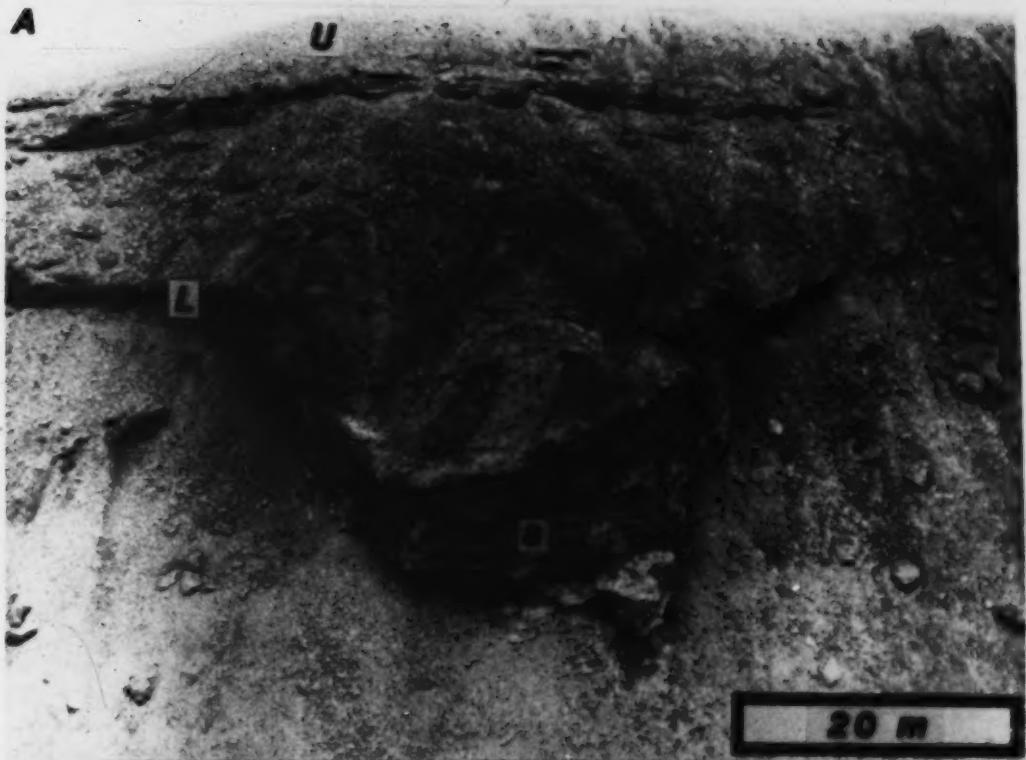


Plate XII.8

A. Rare collapse (a) of the upper member (U) into the lower member (L) of the Cape Crauford Formation, 9 km east of Cape York. Unconformity is marked by the black line.

B. Possible collapse of upper member (U) into the lower member (L). The thick dark basal limestone of the upper member at (b) is downdropped at (c). Grabben structure (a) is filled with breccia. The unconformity between the lower and upper member is marked by a black line. North shore of Port Bowen.

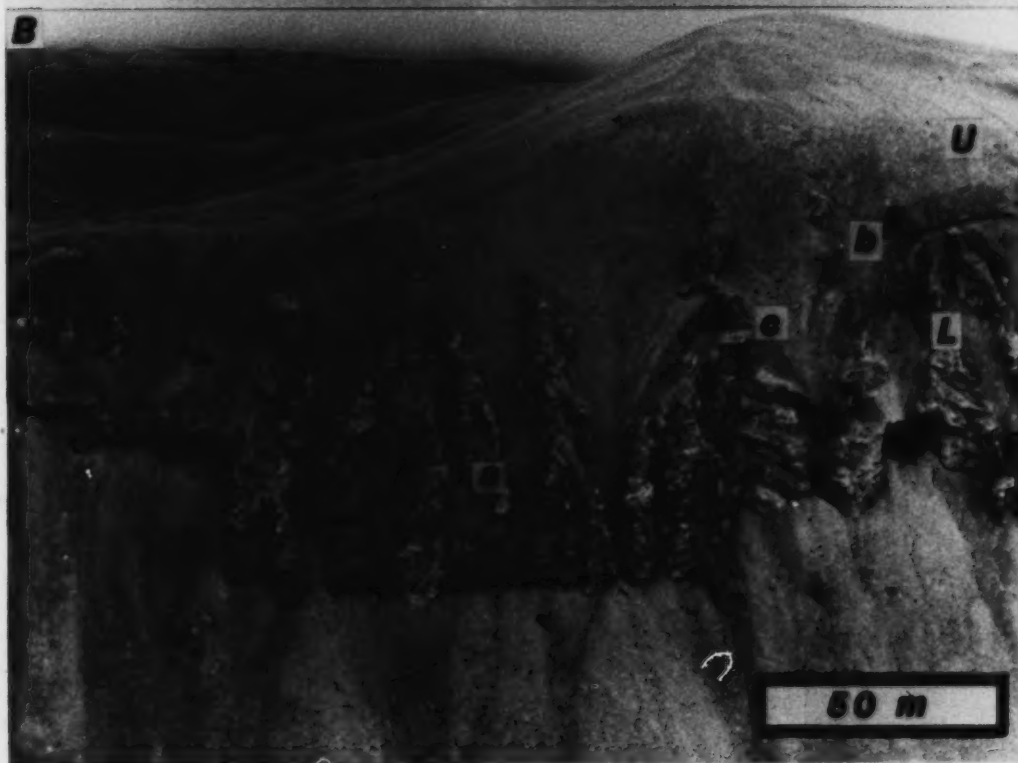


Plate XII.9

A. Numerous breccia pipes (a) in relatively undisturbed strata (b) of the lower member (L) just below the upper member (U) of the Cape Crauford Formation. North Shore of Port Bowen.

B. Small collapse structure in the uppermost part of the lower member of the Cape Crauford Formation opposite section B, Jackson Inlet.

C. Breccia pipe (a) in the lower member (L) of the Cape Crauford Formation, section A, Jackson Inlet. Note downturn of strata (b) adjacent to the pipe and the undisturbed strata of the overlying upper member (U).

D. Downturn of stratum (a) as it passes laterally into a breccia pipe (b). Site is near unit D25, north shore of Port Bowen.

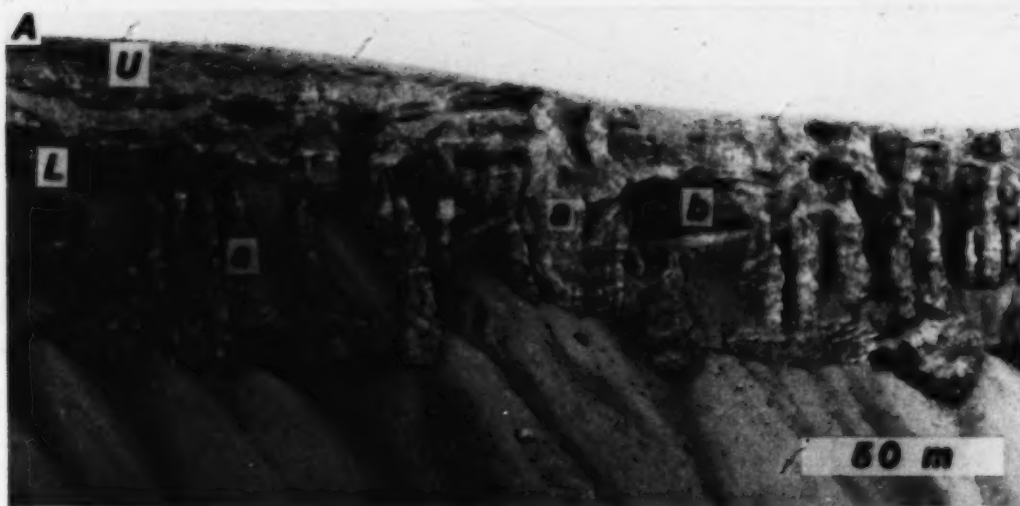


Plate XII.10

A. Dolomitic mottling (light grey) does not pass through the stromatoporoid (a) or the orthoconic/nautiloid (b). Unit E4, member B of the Baillarge Formation, Cape Crauford.

B. Dolomitic mottle (a) between bun-shaped stromatoporoids. A considerable amount of the lower stromatoporoid has dissolved as evidenced by the truncated lamellae, the thick dark residue and the high-amplitude stylolites. Unit C25, lower member of the Cape Crauford Formation.

C. Dolomitic mottling (a) mainly in the area around an articulated pentamerid brachiopod. Only a minor amount of the microspar in the brachiopod (b) has been dolomitized. Slab of sample L10e (stained for calcite), member B of the Baillarge Formation.

D. Dolomitic mottle (a) in microspar (b) between a tabular and a spheroidal stromatoporoid. Slab of sample J5a (stained for calcite), member B of the Baillarge Formation.

E. Disparid(?) crinoid stems (to 50 mm long and 15 mm wide) in a crinoidal biosparite. Note crown with arms (a). Ossicles have crenella and 5-point star-shaped axial canals. Slab of sample G5 (stained for calcite), lower member of the Cape Crauford Formation, Cape Crauford.

F. Stromatolite head (a) is 1.1 m long and elongate at right angles to ripple marks (b) which strike 115°. Unit D2, 4 m below the Baillarge/Cape Crauford formational contact, Port Bowen.

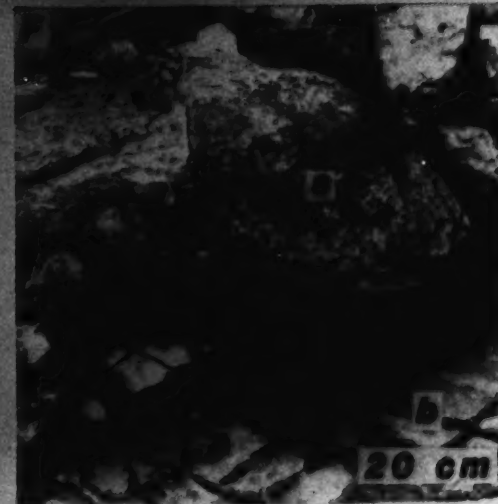
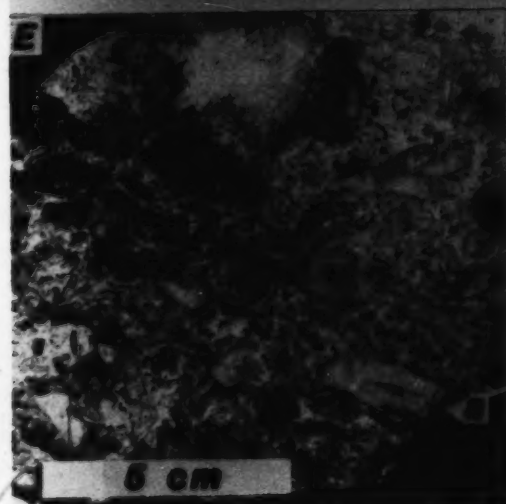
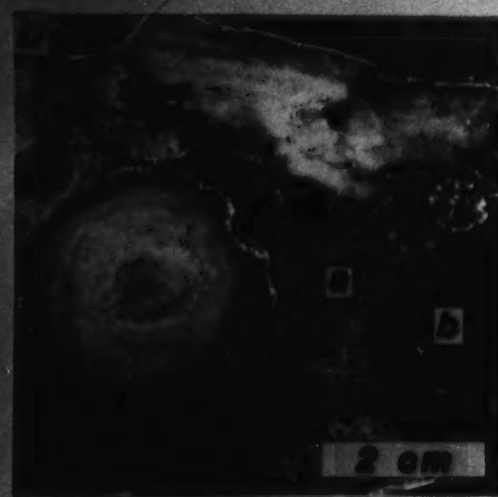
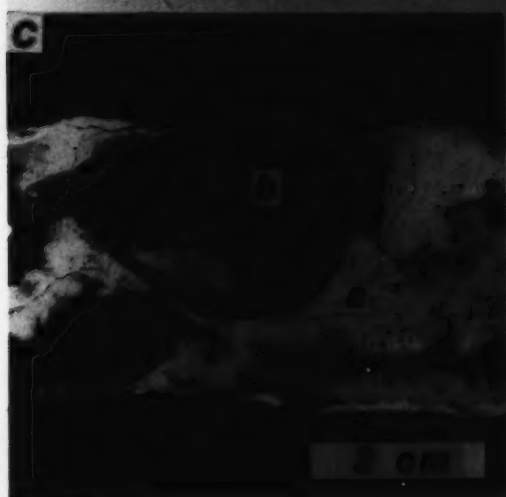
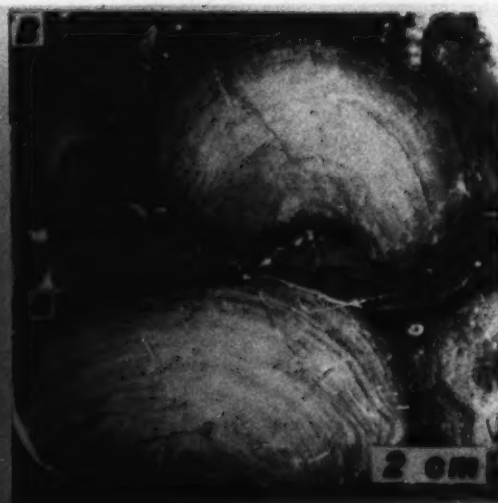
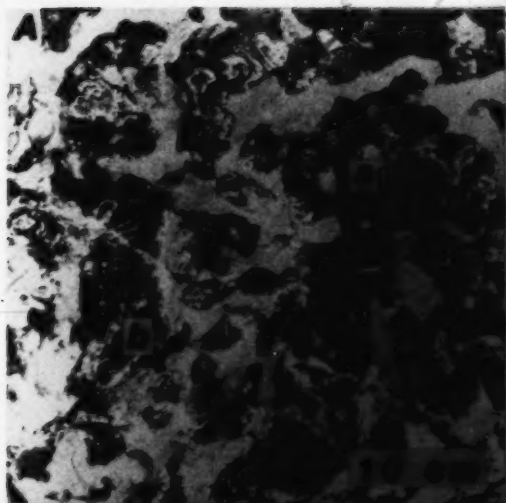


Plate XII.11

A. Digitate stromatolites in a slightly dolomitic/sl sparry microsparite. Fine to medium crystalline dolomite is concentrated mainly along some of the laminae of the stromatolite. Slab of sample E54a stained for calcite, lower member of the Cape Crauford Formation.

B. Columnar stromatolites (a), many of which are grown on intraclasts (b) composed of dolomitic microsparite. Fine-medium crystalline dolomite is concentrated between the stromatolites and between intraclasts. Slab of sample N10 (stained for calcite), member A of the Baillarge Formation.

C. Intraclasts (a) are erosionally truncated at (b), slab of sample MX11a (stained for calcite). Member A of the Baillarge Formation, southwest of Cape Crauford.

D. Gastropod (a) and (b) with remnant texture of algal coating (c) in microsparitic biopelsparite. Slab of sample C25b (stained for calcite), lower member of the Cape Crauford Formation.

E. Slightly sparry coated grain (pisolitic) very fine to fine crystalline dolostone. Coated grains are spheroidal to ellipsoidal, up to 5 mm long and are composed of aphanocrystalline/very fine crystalline dolomite in a very fine to fine crystalline dolomitic 'matrix'. Slab of sample G24 (stained for calcite), lower member of the Cape Crauford Formation, Cape Crauford (see also Plate XII.11F).

F. Coated grains of aphano- to very fine crystalline dolomite, 'matrix' between grains is very fine to fine crystalline dolomite. Thin section of sample G24 (transmitted ordinary light), lower member of the Cape Crauford Formation, Cape Crauford.

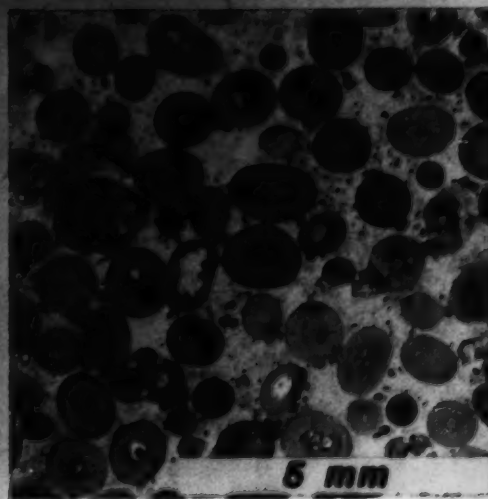
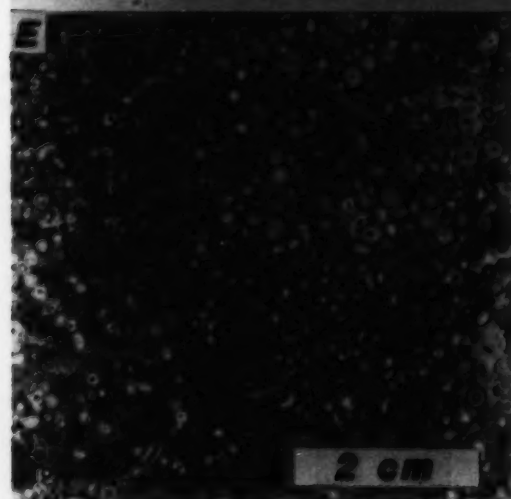
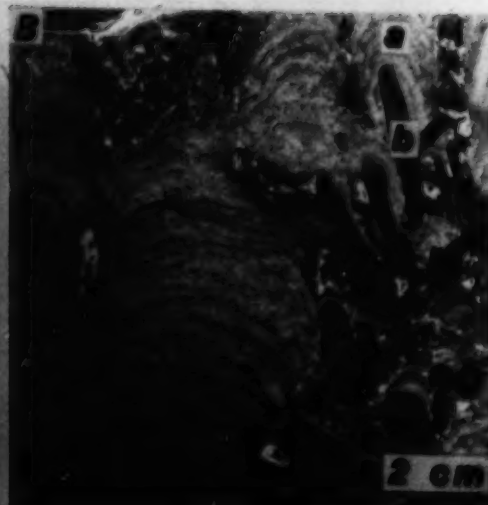


Plate XII.12

- A. Cross-stratification in a medium-grained dololutite to coarse dolarenite. About 15% of the calcarenite grains (dark grey) are composed of fine crystalline spar. Slab of sample R17b (stained for calcite), upper member of the Cape Crauford Formation, Peak Valley.
- B. Intraclasts to 65 mm long, composed of dolomitic microsparite or dolomitic pelmicrosparite. Some intraclasts such as the large one marked (a) are themselves composed of intraclasts. Also shown are thin-shelled brachiopod fragments between the intraclasts. Dolomite is mainly concentrated in intraclasts. Thin section of sample N11, transmitted ordinary light, member A of the Baillarge Formation, southwest of Cape Crauford.
- C. Fine crystalline dark spar pseudomorphs after gypsum crystals in a fine crystalline dolostone (white). Slab of sample A87 (stained for calcite), lower member of the Cape Crauford Formation, Jackson Inlet.
- D. Gypsum crystal moulds (a) (some with swallowtail terminations) in a dolomitic pelsparite. Calcified dolomite is common, slab of sample E68 (stained for calcite), lower member of the Cape Crauford Formation, Cape Crauford.
- E. Club-shaped stromatolitic structure comprises interlaminated microsparite (dark) and fine to medium crystalline dolostone (white). Slab of sample C44 (stained for calcite), lower member of the Cape Crauford Formation, Jackson Inlet.
- F. Columnar stromatolitic structures (a) separated by bioturbated dolostone (b) containing circular 'tubes' to 1.5 mm in diameter. The stromatolitic structures (a) are composed of dolomitic and microsparitic sparite in a clotted texture. Material between the stromatolites include microsparitic and sparry fine to medium crystalline dolostone and calcified dolomite is also common. Slab of sample H72 (stained for calcite), unit B of the upper member of the Cape Crauford Formation, Cape York.

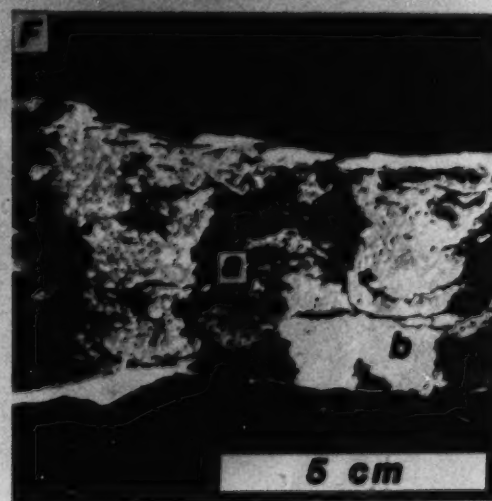
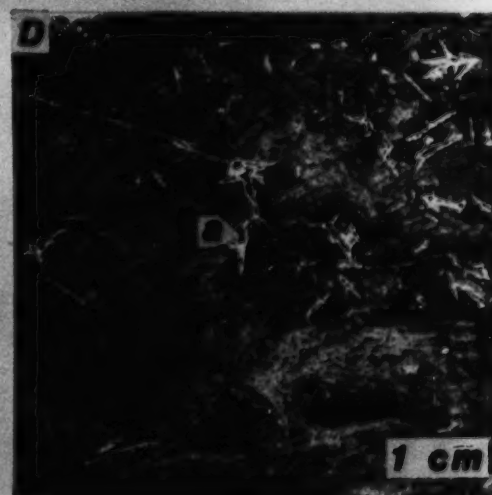
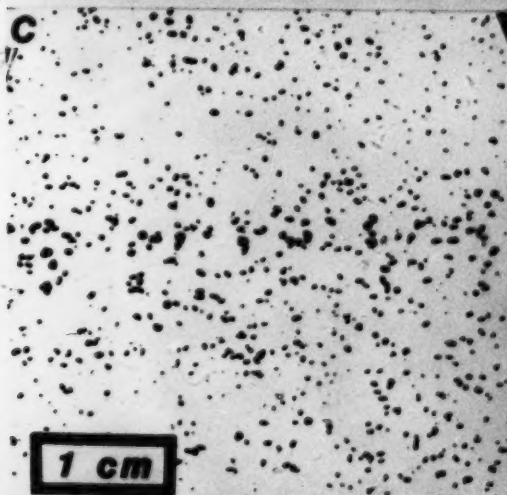
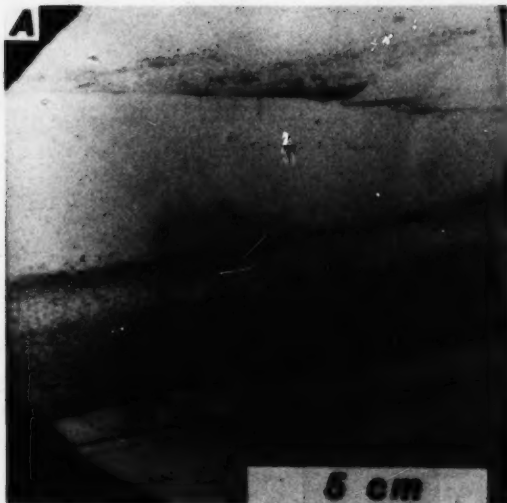


Plate XII.13

A. Mottled dolomitic microsparite. Atypical mottles e.g., (a) consist of irregularly-shaped isolated patches of microspar (dark grey) 'floating' in variously dolomitic 'matrix' (light grey). Dolomite rhombs are commonly corroded and contain microspar inclusions. Slab of sample D36 (stained for calcite), lower member of the Cape Crauford Formation, Port Bowen.

B. Calcareous dolostone (a) is separated from limestone (b) in the same bed by a subvertical fracture. Dolomitization occurred after fracturing. Slab of sample A65b (stained for calcite), lower member of the Cape Crauford Formation, Jackson Inlet.

C. Minor scouring (a) in an interlaminated dololutite and very fine grained dolarenite. Note the 'wood-grain' patterned appearance. Slab of sample N4a (stained for calcite), Member A of the Baillarge Formation, southwest of Cape Crauford.

D. Bitumen (black) in corallites of a favositid coral fragment. Bitumen does not fill secondary corroded dolomite porosity and petrographic relations suggest that the corallites were dolomitized, partly silicified, calcified, and filled with bitumen. Finally, spar was dissolved to produce the corroded dolomite. Slab of sample D9 (stained for calcite), member B of the Baillarge Formation, Port Bowen.

E. Abundant fossils, including dasyclad algae, ossicles, gastropods, ostracods, solitary corals, and trace brachiopod fragments in a mottled micritic/dolomitic biomicrosparite 'matrix'. Thin section of sample L2c (stained for calcite), transmitted ordinary light. Member B of the Baillarge Formation, 28 km southwest of Cape Crauford.

F. Close-up view of sample L2c (Plate XII.13E) in thin section showing equant crystals of micrite with low intercrystalline porosity, cross-polarized light.

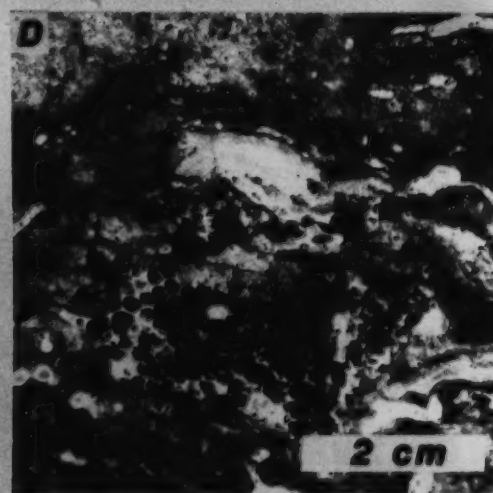
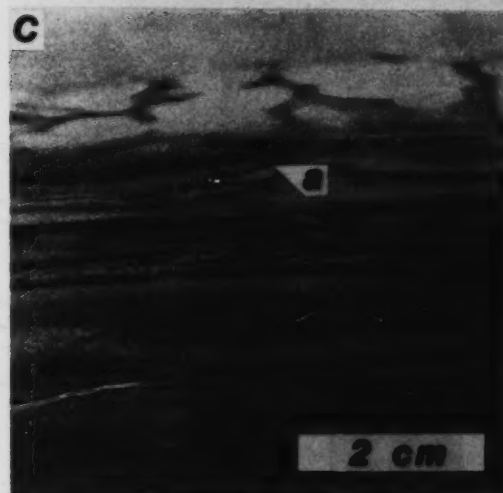
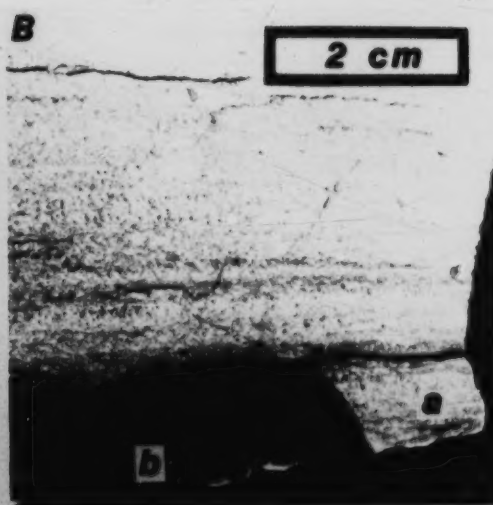
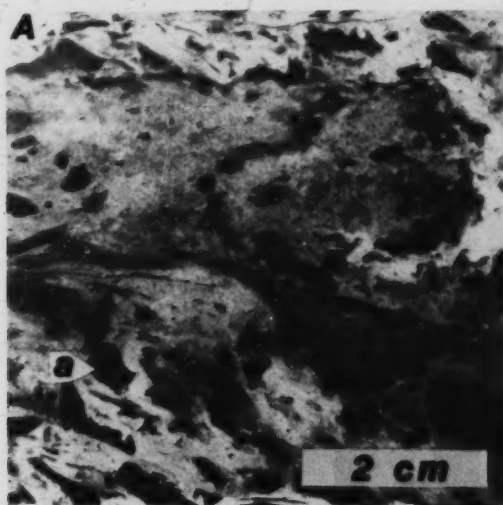


Plate XII.14

A. Flowstone (a) along wall of a fine crystalline spar-mottled (b) biopelsparite (c). Spar comprising the mottles is undoubtedly calcified fine crystalline dolomite. Slab of sample Ola (stained for calcite); member B of the Baillarge Formation, 28 km southwest of Cape Crauford.

B. Irregularly-shaped poorly developed dolomitic mottles (a) are bounded by stylolites in a sparitic/micritic biomicrosparite (b). Calcified dolomite is common as composite microspar replacing rims and cores of dolomite rhombs. Minor subvertical fractures, which terminate at stylolites are also accentuated by residue. Slab of sample L3 (stained for calcite), member B of the Baillarge Formation, 28 km southwest of Cape Crauford.

C. Calcified dolomitic mottles (a) cross the walls of a *Catenipora* colony in an ossicle-rich biomicrosparite (b). Slab of sample L7h (stained for calcite), 137 m above the base of member B, of the Baillarge Formation, 28 km southwest of Cape Crauford.

D. Low-amplitude 'wispy' stylolites (a) separate irregular 'lumpy' beds (b) in a slightly sparry ostracodal biopelmicrosparite. Thin section of sample C19a, ordinary transmitted light. Lower member of the Cape Crauford Formation, Jackson Inlet.

E. Geopetal fabric of spar (a) over peloids (b) in an articulated ostracod. Ostracod occurs in a dolomitic slightly sparry biopelmicrosparite. Thin section of sample C33 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation, Jackson Inlet.

F. Wavy lamination and low-amplitude stylolites in a slightly sparry pelmicrosparite. Slab of sample C66 (stained for calcite), lower member of the Cape Crauford Formation, Jackson Inlet.

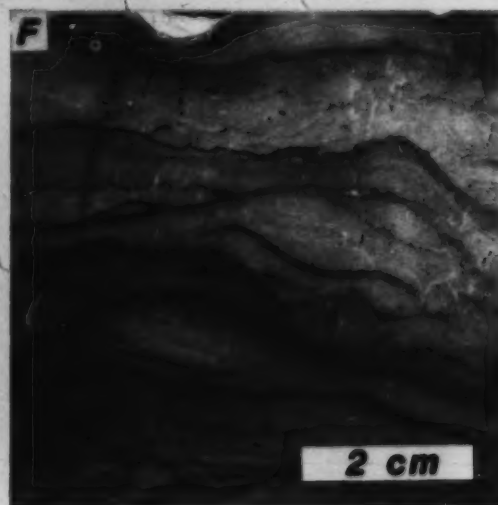
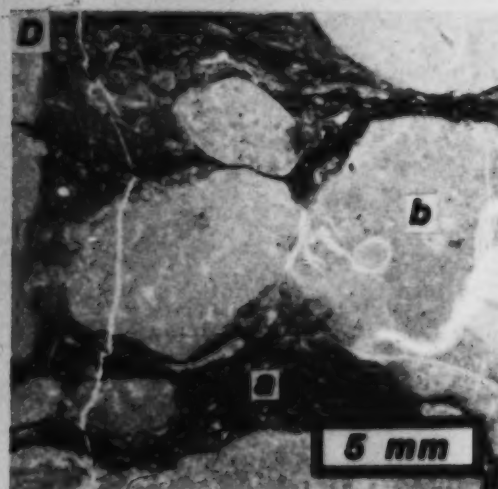
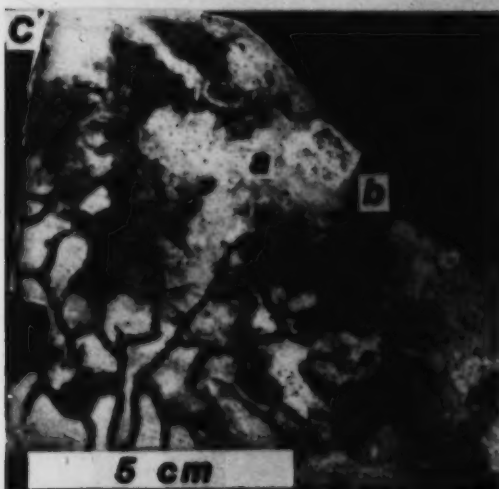


Plate XII.15

A. Numerous high-amplitude (to 15 mm) stylolites cross-cut breccia clast boundaries. Stylolites are accentuated by an average 75 μ m thick dark brown opaque residue. The rock is a rubble breccia consisting of microsparite/sparite 'clasts' from 2 to 20 mm in size with a fine to medium crystalline sparite 'matrix'. Thin section of sample B22, ordinary transmitted light, lower member of the Cape Crauford Formation.

B. Numerous very high amplitude columnar stylolites with abundant residue (a) in a dolomitic sparry microsparite 'clast' crackle (stylo-) breccia. Stylolites define a subvertical lineation. Thin section of sample E25 (stained for calcite), transmitted ordinary light. Base of lower member of the Cape Crauford Formation, Cape Crauford.

C. High-amplitude stylolites and convex-up structures in a slightly dolomitic fine crystalline sparite. Slab of sample A43 (stained for calcite), lower member of the Cape Crauford Formation, Jackson Inlet.

D. A fine crystalline dolostone 'clast'-fine crystalline dolostone 'matrix' mosaic breccia. Slab of sample A18 (stained for calcite), member B of the Baillarge Formation, Jackson Inlet.

E. Mosaic to rubble breccia consists of dolomitic slightly ostracodal pelmicrosparite clasts (a) in a fine to coarse crystalline sparite 'matrix' (b). Thin section of sample G35 (stained for calcite), transmitted ordinary light. Base of lower member of the Cape Crauford Formation.

F. High-amplitude stylolites in a micritic microsparite to fine crystalline sparite 'clast and matrix' mosaic to rubble breccia. Breccia clasts (a) and (b) were once united. Slab of sample J45 (stained for calcite), lower member of the Cape Crauford Formation, Stanley Point.

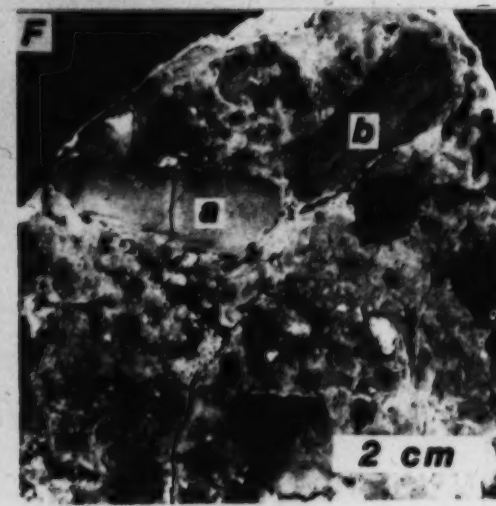
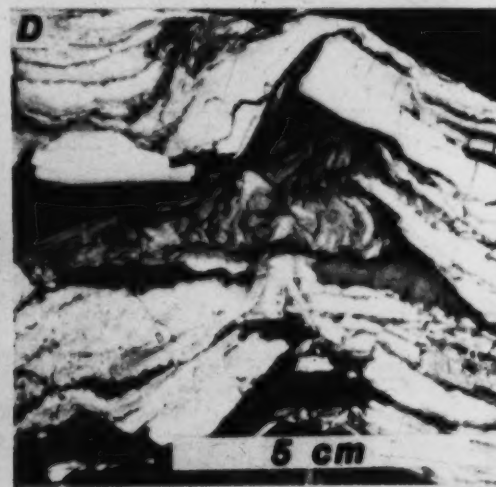
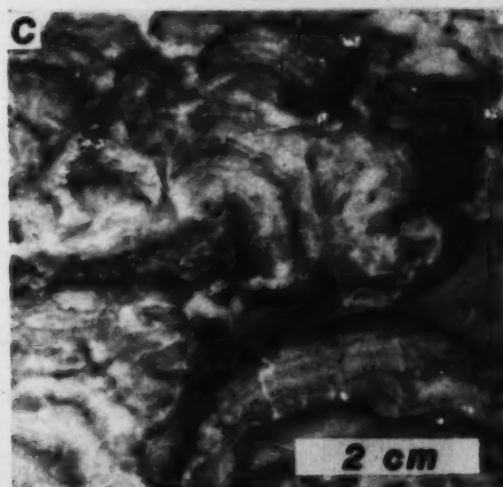
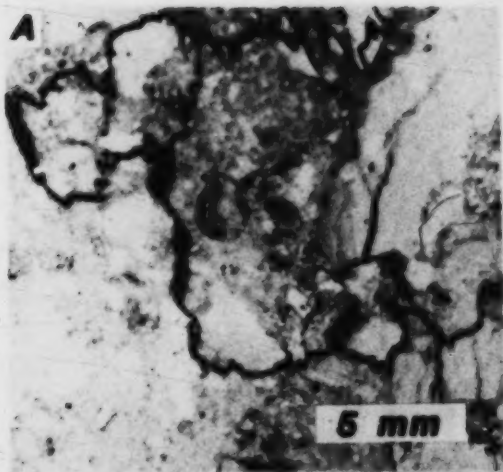


Plate XII.16

A. Convex-up structures of unit MX15 (a) are overlain by inversely-graded breccia of unit MX16 (b). Breccia consists of subangular to subrounded clasts of pelsparite, microsparite and polycrystalline quartz in a fine crystalline sparite 'matrix'. The MX16 breccia (b) thins abruptly in the left part of the photograph (d). Although a fault appears to be present between (c) and (d), the strata are traceable across it higher in unit MX17 (c), a constraint that requires strata at (d) to be equivalent with breccia at (b). In fact, joints form the abrupt vertical contact between breccia and non-breccia. Member A of the Baillarge Formation, 30 km southwest of Cape Crauford.

B. Close-up view of the lower right part of Plate XII.16A showing convex-up structures of unit MX15 (a) and the overlying MX16 breccia (b), southwest of Cape Crauford.

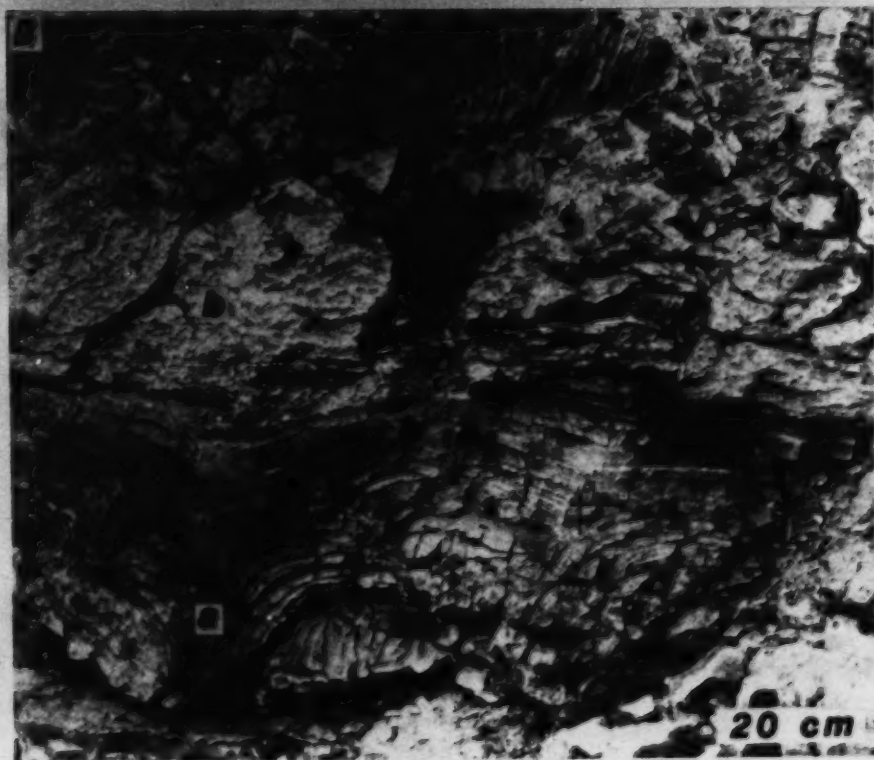


Plate XII.17

A. Hummocky basal contact of 35 m high breccia pipe (a) cross-cuts original stratification (b). The breccia is inversely graded with respect to clast size and grades up from crackle to rubble breccia. Unbrecciated strata of unit A87 (a) are slightly hummocky, though much less so than the breccia/non-breccia contact. Lower member of the Cape Crauford Formation, Jackson Inlet.

B. Convex-up structures (a) in and overlain by breccia (b). Unit G29a, about 18 m below the unconformity between the upper and lower members of the Cape Crauford Formation, Cape Crauford.

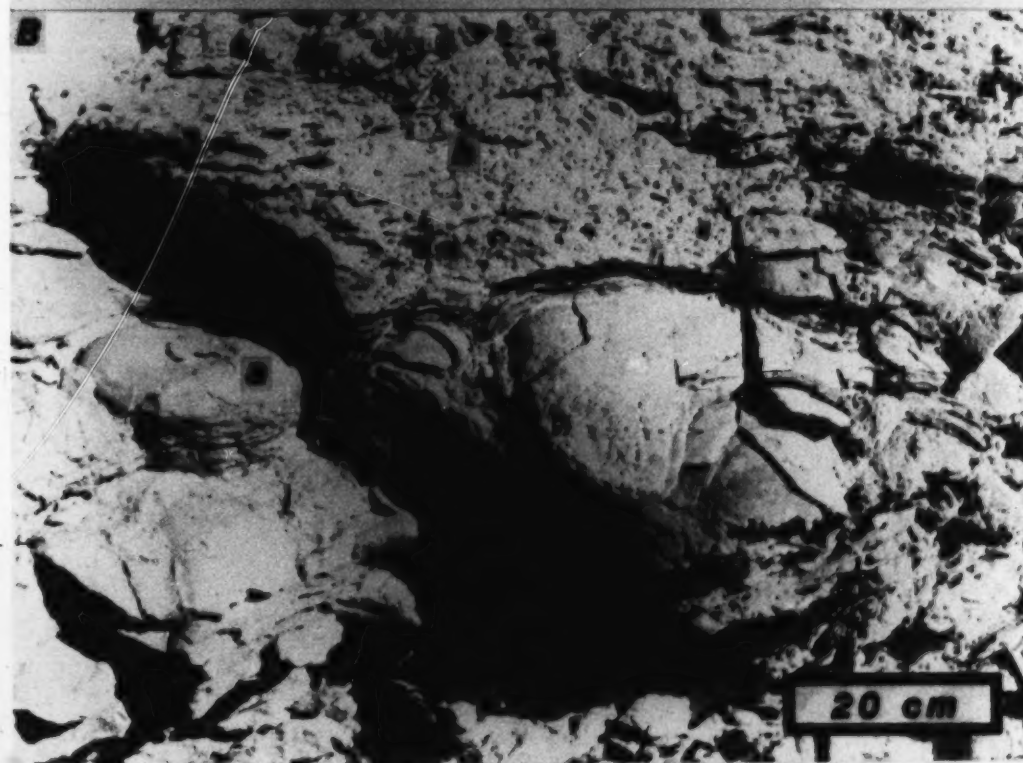


Plate XII.18

A. Superimposed hummocky structures on various scales at the base of a stratified breccia. Unit F21, lower member of the Cape Crauford Formation, Cape Crauford. Field assistant is beside this "mound" in Plate XII.2A.

B. Fine crystalline dolostone of unit B16 (a) with locally developed small scale discordant breccias (b) and (c). Breccia at (c) is developed from a bed equivalent to (d) and the joint-bounded breccia at (b) is similarly developed from strata once equivalent to the adjacent unbrecciated strata. The overlying mosaic to rubble breccia of unit B17 is 2.5 m thick, 10 m wide and contains calcareous dolostone clasts up to 20 cm in size. Lower member of the Cape Crauford Formation, Jackson Inlet.

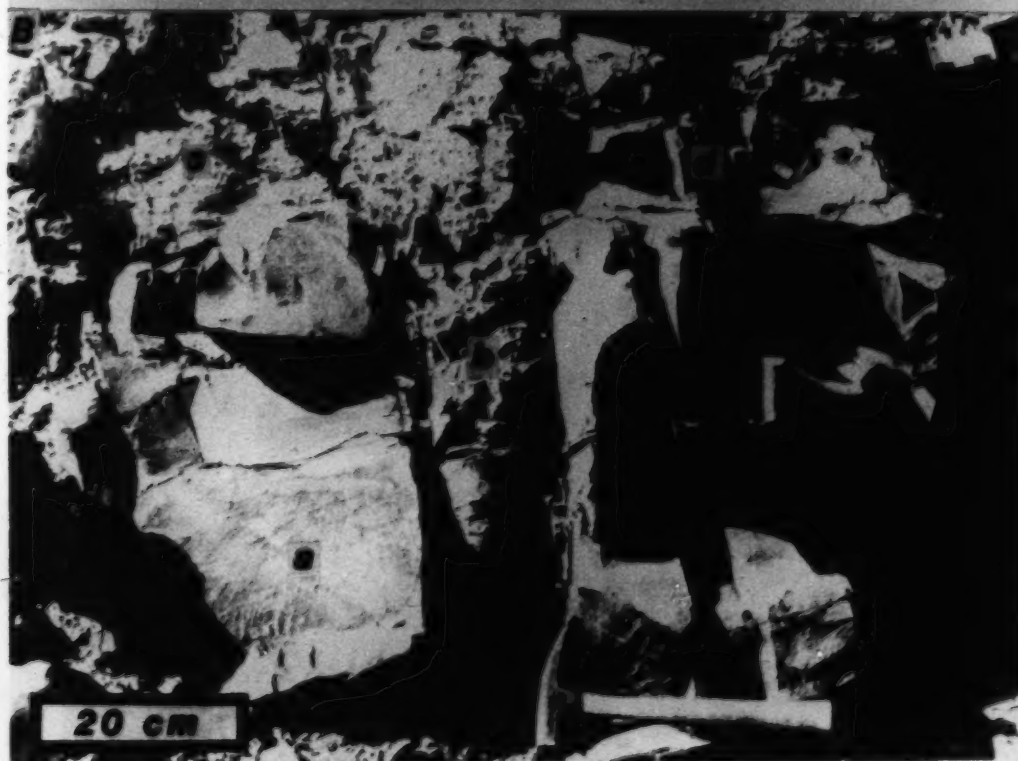


Plate XII.19

A. High-amplitude stylolites in a crackle breccia at the base of a 5 m thick rubble breccia. Slab of sample A66 (stained for calcite), a microsparitic fine crystalline sparite crackle breccia, lower member of the Cape Crauford Formation.

B. Columnar high-amplitude stylolites with subvertical lineation in breccia of unit C17; lower member of the Cape Crauford Formation.

C. High-amplitude (to 15 mm) stylolites (a) accentuated by dark residue (400 μ m thick). Slab of sample C17a (stained for calcite), a vuggy microsparitic fine crystalline sparite crackle breccia. Lower member of the Cape Crauford Formation, Jackson Inlet.

D. High-amplitude (to 6 mm) stylolites in a microsparitic fine to medium crystalline sparite 'clast and matrix' breccia. Subvertical fractures commonly terminate at stylolites or at vugs along stylolites. Sample J37 (cut surface at front) taken at the base of a 4 m thick inversely-graded breccia. Lower member of the Cape Crauford Formation, Stanley Point.

E. Convex-up contact between unit A73, a laminated fine crystalline sparite (a) and unit A74, a mosaic to rubble breccia (b) consisting of mainly fine crystalline sparite 'clasts' in a microsparite 'matrix'. Breccia at (c) is discordant and laterally equivalent with laminae at (a). Lower member of the Cape Crauford Formation, Jackson Inlet.

F. Planar to hummocky laminated (locally brecciated) very fine to fine crystalline dolostone in unit J55 (a) is overlain and in part laterally equivalent with both contorted strata and crackle breccia of unit J56 (b). Spar fills and/or replaces material along stylolites and fractures. Lower member of the the Cape Crauford Formation, Stanley Point.

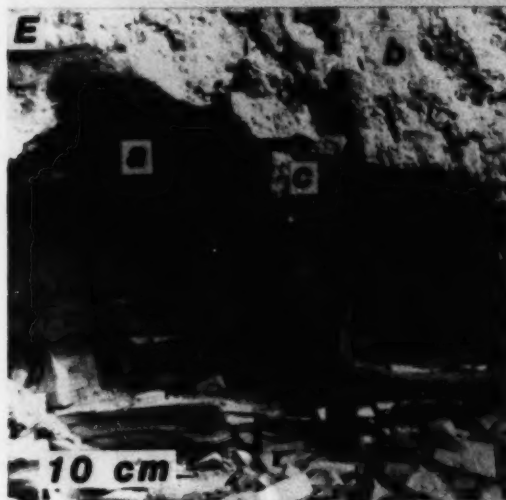
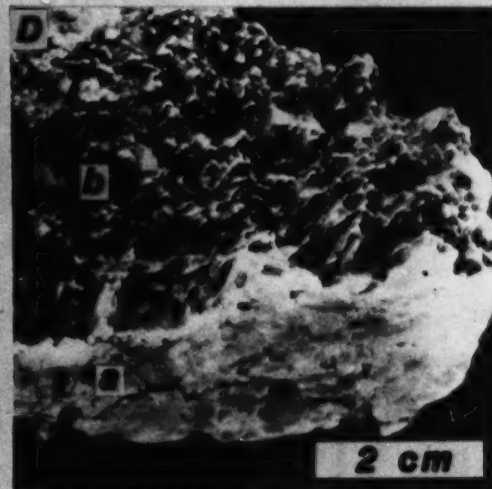
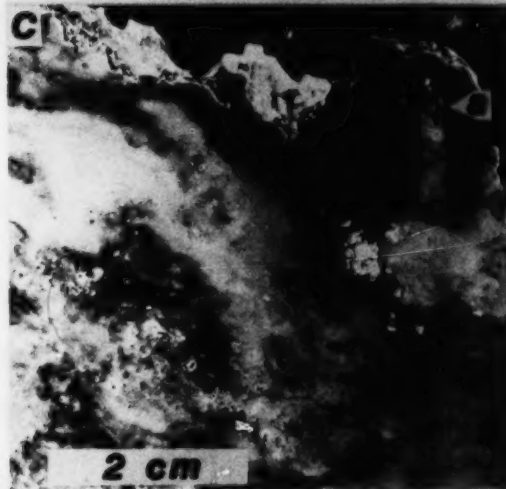
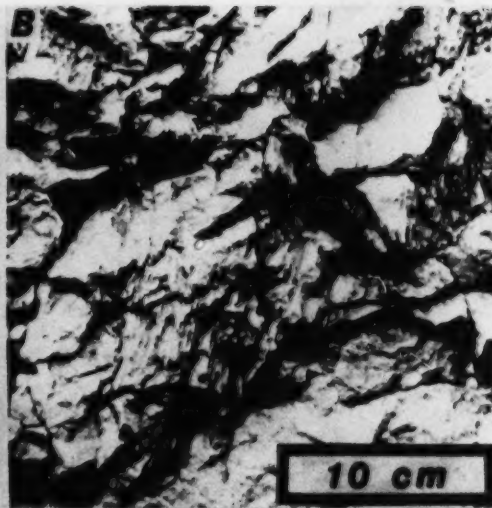
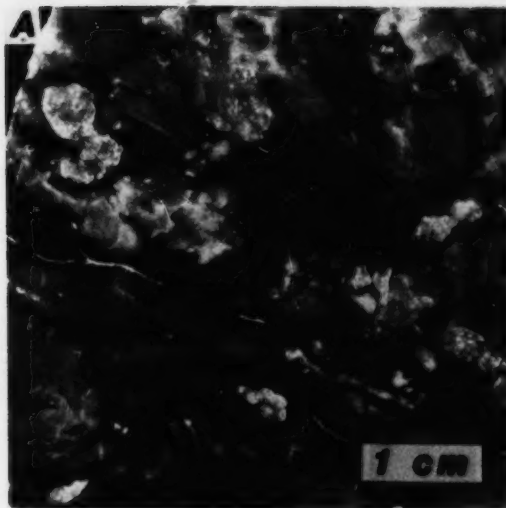


Plate XII.20

A. Discordant contact between unit J18, a brachiopodal fine to medium crystalline dolostone (a) and unit J19, a dolomitic limestone crackle breccia (b). Lower member of the Cape Crauford Formation, Stanley Point.

B. Laterally continuous strata (a) overlie breccia (b). A block of the buff stratum (c) has dropped down into the underlying contorted and brecciated strata. Lower member of the Cape Crauford Formation, 5.5 km northwest of Cape Crauford.

C. 'Fold' (a) is overlain by brecciated strata (b). Note cavernous weathering. Lower member of the Cape Crauford Formation between sections A and C, Jackson Inlet.

D. Fine clast breccia (unit A48) at (a) is overlain by a coarse clast rubble breccia (unit A49) at (b). Note large clast (outlined) at (c). Field assistants for scale. Lower member of the Cape Crauford Formation.

E. Close-up of contact between units A48 (a) and A49 (b). Lower member of the Cape Crauford Formation.

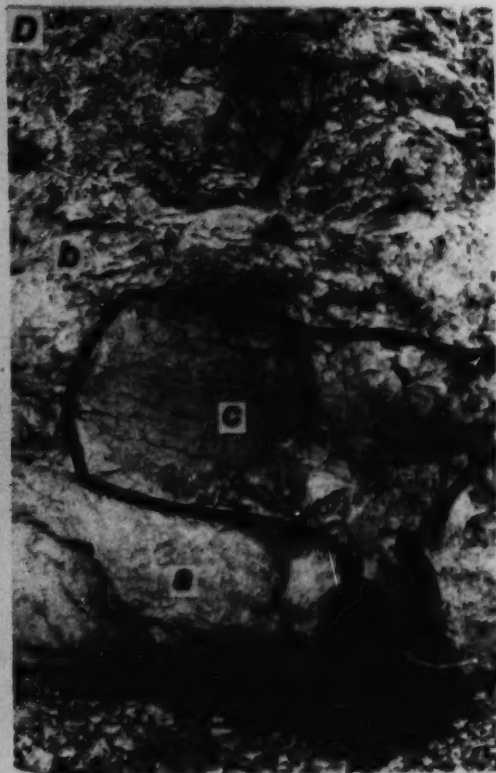
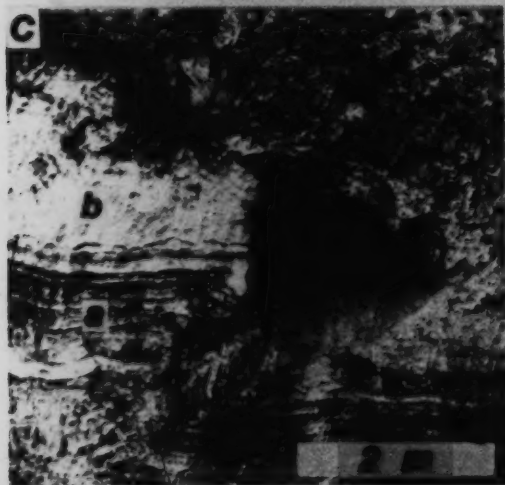
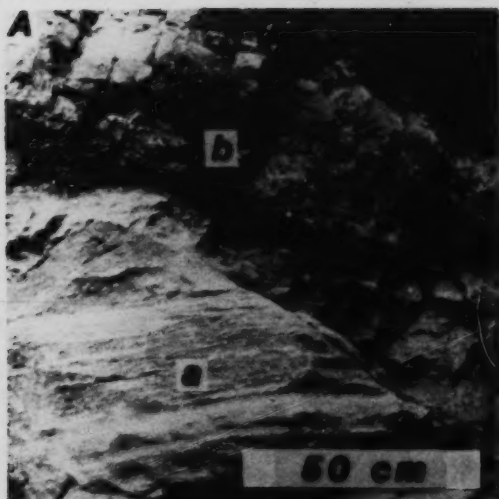


Plate XII.21

A. Breccia pipes (a) extend down from unbrecciated strata (b). Lower member of the Cape Crauford Formation. The vertical field of view comprises the interval from 110 to 150 m in section F, Cape Crauford.

B. Flowstone (a) at the contact between unbrecciated mottled dolomitic limestone and a breccia pipe (b). Unit L14, member B of the Baillarge Formation.

C. Large breccia clast (a) is itself composed of buff dolostone breccia clasts. The breccia also contains both buff dolomitic and dark brown calcareous clasts (b). Unit DX2, lower member of the Cape Crauford Formation, Port Bowen.

D. Contorted breccia clast (a) in inverse graded breccia (b), 0.6 m above the base of unit A49 (see also Plate XII.20D). Lower member of the Cape Crauford Formation, Jackson Inlet.

E. Coated breccia clast (a) in a 'lens' of coated clasts. Calcified dolomite is abundant both in and between clasts, the boundaries of many of which are stylolitic. Slab of sample E40, lower member of the Cape Crauford Formation, Cape Crauford.

F. Colonial coral breccia clasts vary from rounded (a) to angular (b) in a rubble breccia. 'Clasts' consist mainly of biopelsparite in a sparry microsparite 'matrix'. Slab of sample O1b (stained for calcite), uppermost part of member B of the Baillarge Formation.

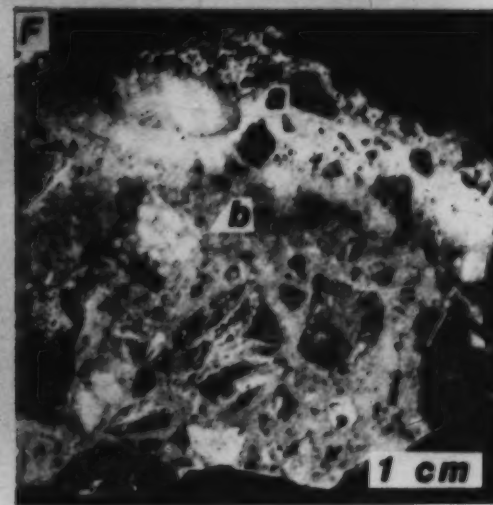
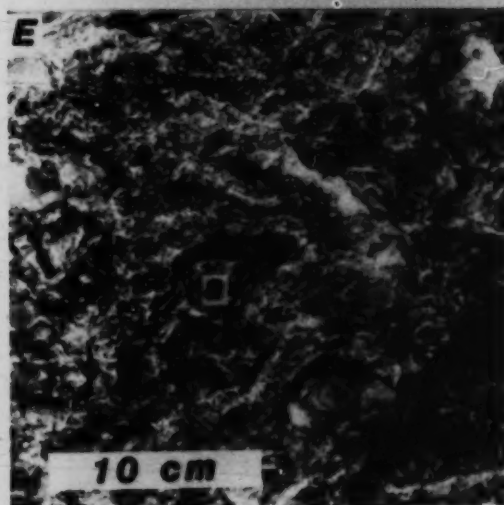
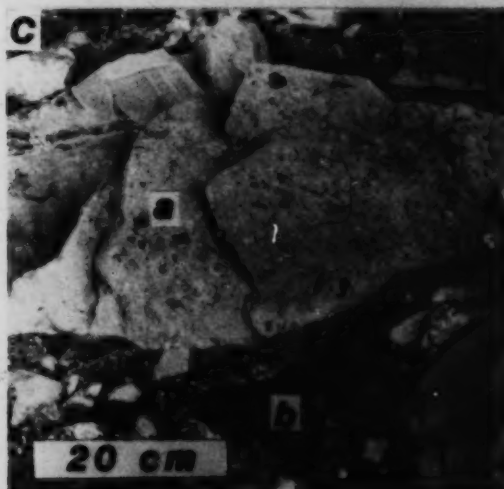
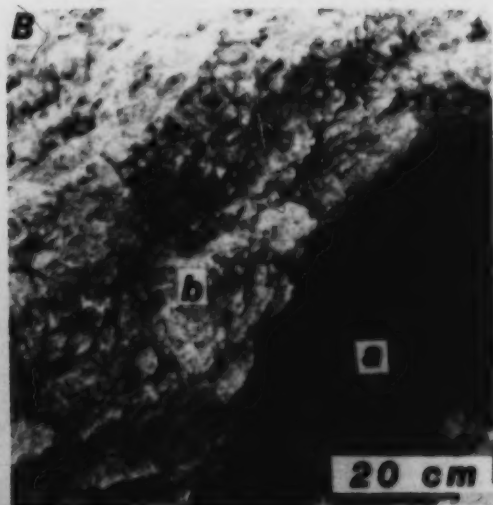


Plate XII.22

A. Breccia clasts of polycrystalline quartz (a) and pelsparite (b) in a rubble breccia. 'Matrix' between clasts is a fine crystalline sparite. Slab of sample MX16 (stained for calcite), member A of the Baillarge Formation, 30 km southwest of Cape Crauford.

B. Crackle breccia contains 12% fossils, including favositid and chain coral fragments, 4% ossicles, one 18 mm long echinoderm stem fragment, 3% stromatoporoids and 5% ostracods. Slab of sample E77 (stained for calcite), a sparry biomicrosparite crackle breccia, lower member of the Cape Crauford Formation, Cape Crauford.

C. Large clast at center appears to display a solution 'microunconformity' in which the central laminae have dissolved. High-amplitude stylolites occur between breccia clasts. In addition, coarse calcirudite-sized rubble breccia; dolomitic fine crystalline sparite 'clast' fine to medium crystalline sparite 'matrix' breccia. Slab of sample L12 (stained for calcite), member B of the Baillarge Formation.

D. Many of the clasts and parts of clasts are bleached in this crackle to mosaic breccia. The 'clasts' consist of slightly dolomitic ostracodal pelmicrosparite and the 'matrix' comprises microsparite to fine crystalline sparite. Slab of sample E-81 (stained for calcite), lower member of the Cape Crauford Formation, Cape Crauford.

E. Bleached clasts and parts of clasts (a) and unbleached clasts (b) from the same sample illustrated in Plate XII.22D. Thin section of sample E81 (stained for calcite), transmitted ordinary light. Lower member of the Cape Crauford Formation, Cape Crauford.

F. Pervasive high-amplitude (to 6 mm) stylolites (a) in a 3 cm wide subvertical breccia vein. Some high-amplitude stylolites in the veins may be traced laterally into low amplitude stylolites in the unbrecciated rock. Slab of sample J71 (stained for calcite), a locally brecciated microsparitic fine to medium crystalline sparite. Base of the upper member of the Cape Crauford Formation, Stanley Point.

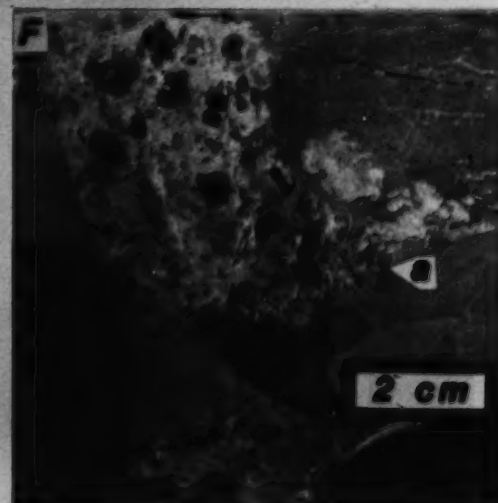
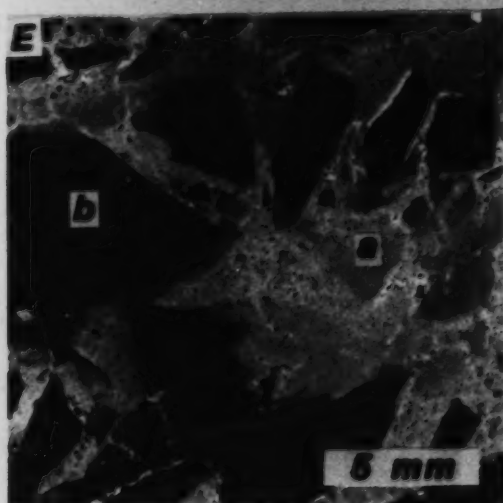
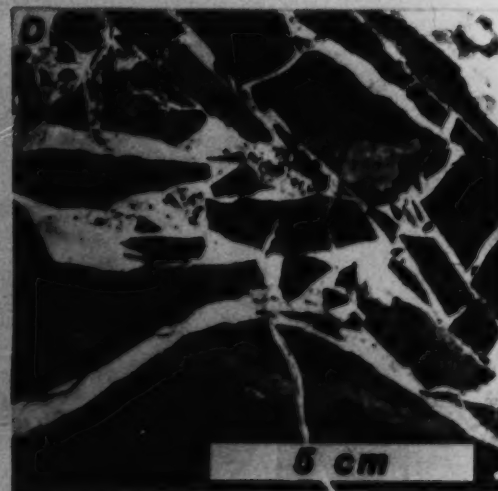
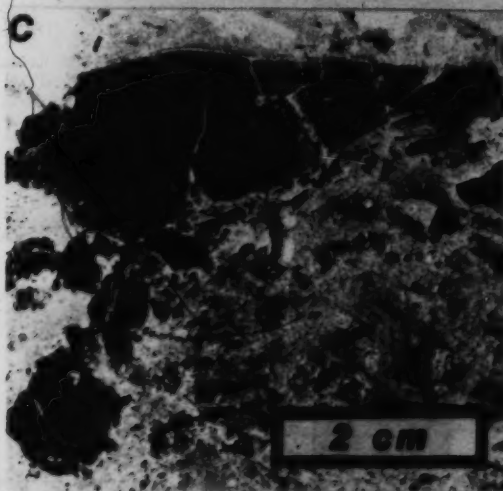
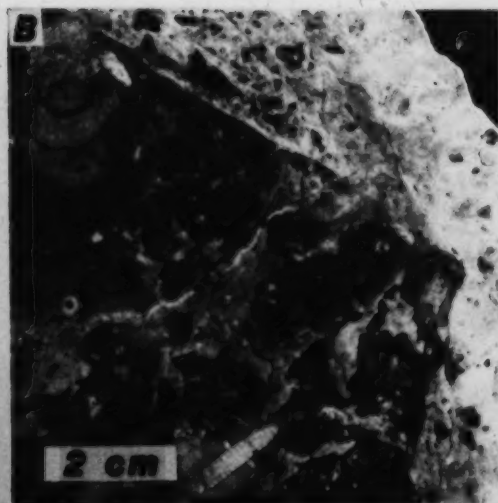
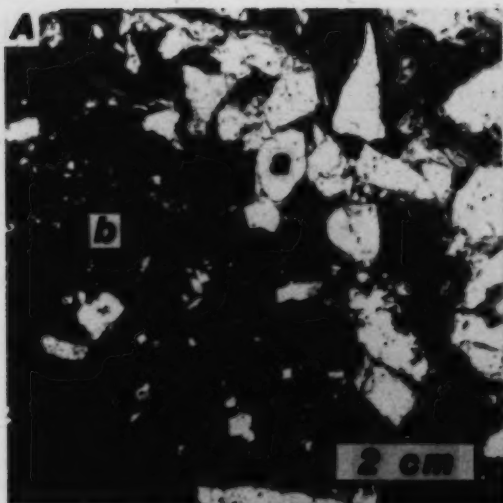


Plate XII.23

A. High-amplitude (to 8 mm) columnar stylolites, accentuated by 200 μ m thick black residue which forms the breccia clast boundaries. The residue at the top and bottom of the clasts is thicker than the residue along the clast sides. High-amplitude stylolites at the base of the sample cross-cut breccia clasts. Slab of sample R8 (stained for calcite), taken about 8 m above the base of the breccia. The sample is a sparite 'clast and matrix' crackle breccia. Lower member of the Cape Crauford Formation, Peak Valley.

B. Sparite 'matrix and clast' mosaic breccia with a high proportion of clast moulds. The centers of some clasts are dissolved and lined with clear medium crystalline spar and a trace of malachite. Slab of sample J46 (stained for calcite), lower member of the Cape Crauford Formation.

C. Fine crystalline dolostone clasts (a) and clast moulds (b) cemented by extremely coarse crystalline spar (c) in rubble breccia. Unit B1, member B of the Baillarge Formation, Jackson Inlet.

D. Dolostone clast (a) with a spar-rich rim (b) displays contorted lamination. 'Matrix' (c) consists of dolomitic fine crystalline sparite. The one centimetre wide outer 'rim' (b) consists of dolomitic fine crystalline sparite, probably filling leached calcified dolomite moulds. The center of the clast (a) is porous and has been leached of spar. Slab of sample DX2 stained for calcite, lower member of the Cape Crauford Formation, Port Bowen. Contorted structures are inversely graded with respect to size in this unit.

E. Diagenetic hummocky convex-up structures are truncated at the base by stylolites. The sample below the hummocky structures is a dolomitic/microsparitic fine crystalline sparite crackle breccia. Fine crystalline dolomite (partly calcified) is concentrated in the hummocky laminae. Slab of sample C36 (stained for calcite) from near the base of a locally brecciated unit, lower member of the Cape Crauford Formation, Jackson Inlet.

F. Coated or diagenetically altered clast near the base of a 17 m thick breccia consists of concentrically interlaminated medium to coarse crystalline spar (dark grey) and medium crystalline dolomite (white). Dolomite has been extensively calcified. Slab of sample A49b (stained for calcite), lower member of the Cape Crauford Formation, Jackson Inlet.

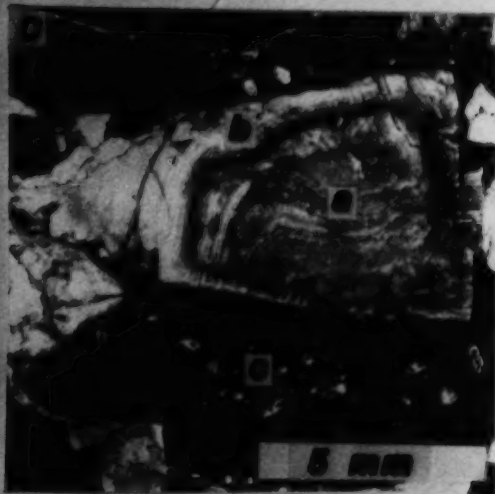
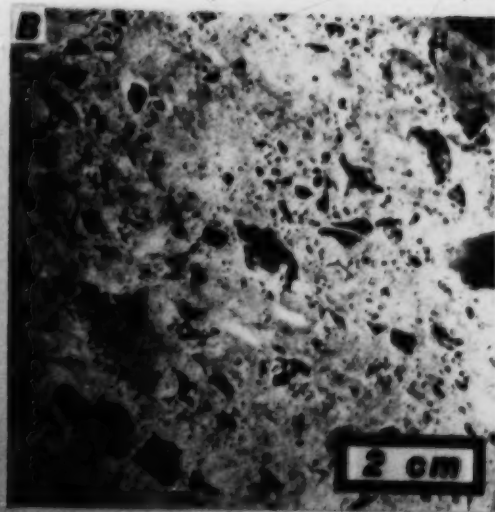
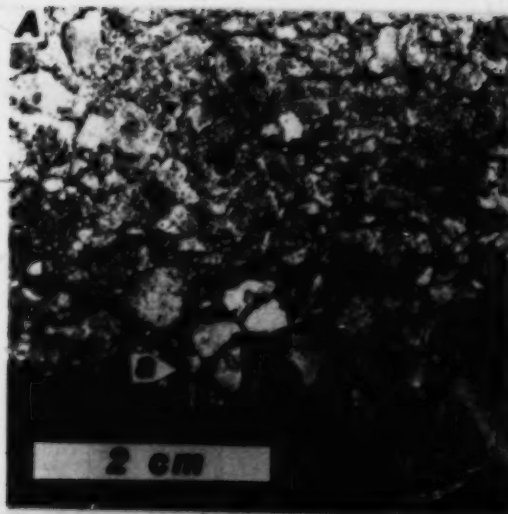


Plate XII.24

A. Breccia (a) is overlain by a local 'lens' of altered and coated clasts (b). Non-brecciated strata are present at (c). Coastal cliff exposure 470 m east and stratigraphically a few metres below the base of section H. Lower member of the Cape Crauford Formation, 8 km east of Cape York.

B. Close-up of upper right part of Plate XII.27A above, showing altered and coated clasts (a), the lateral transition to unbrecciated strata (b), and overlying hummocky structures (c).

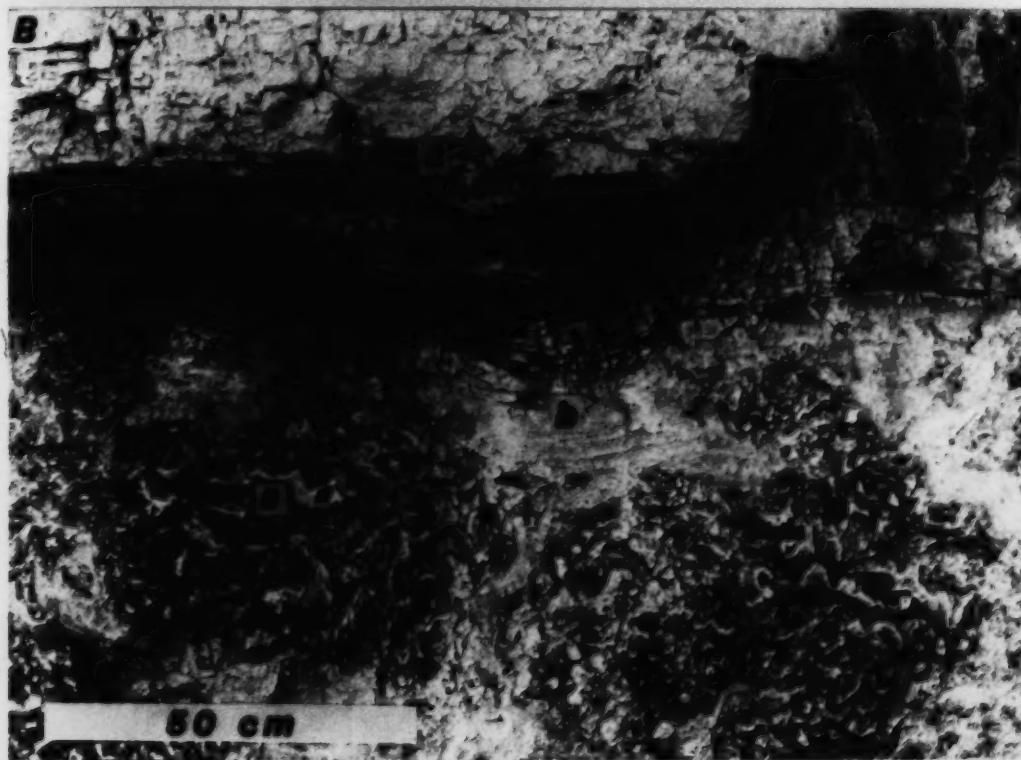


Plate XII.25

A. Coated clasts in breccia; concentric lamellae of overgrowths with polygonal fit are defined by inclusion-rich and inclusion-poor crystal zones. High-amplitude (to 10 mm) stylolites are marked by 250 μ m thick residues and form the base of the coated clasts. Stylolites do not occur inside coated clasts. Slab of sample H1 (stained for calcite), lower member of the Cape Crauford Formation near Cape York. Thin section of rectangular area outlined in black is shown in Plate XII.25B.

B. Concentric pisolitic coatings (a) on clast (b) with basal stylolitic contact (c). Thin section of rectangular area shown in Plate XII. 25A, transmitted ordinary light.

C. Coatings (a) on breccia clasts. 'Matrix' (b) between breccia clasts contains a high concentration of calcified dolomite. Solution pipe (c) penetrates the coatings (a). Slab of sample E28, lower member of the Cape Crauford Formation, Cape Crauford.

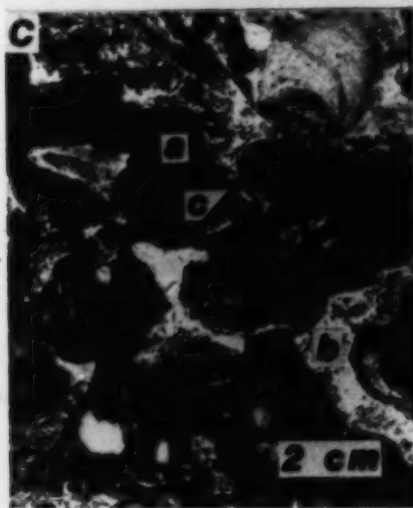
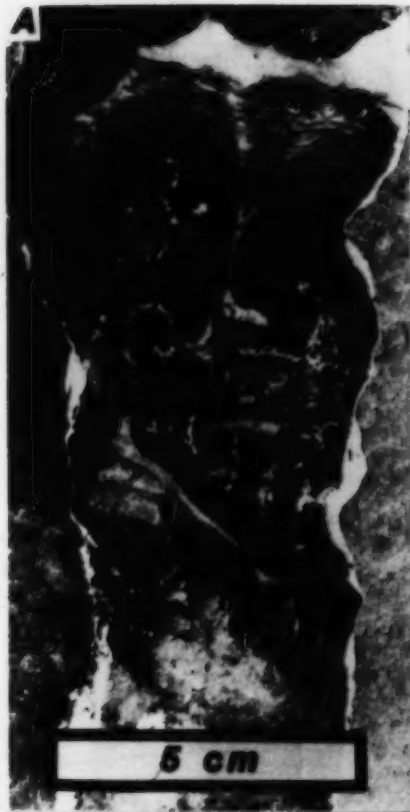


Plate XII.26

A. Breccia clasts (a) are coated (b) with microspar and spar in a clotted texture. Calcification of dolomite between coated clasts (c) has been extensive. Vugs are up to 2 cm in size where leaching has occurred. Slab of sample E28 (stained for calcite), lower member of the Cape Crauford Formation, Cape Crauford.

B. Vuggy crackle to mosaic breccia. Clasts consist of microsparite in a clotted texture. The 'matrix' is fine to medium crystalline sparite and microsparite. Slab of sample H11 (stained for calcite), lower member of the Cape Crauford Formation, Cape York.

C. Coated grains up to 20 mm long are elongate parallel to bedding. Slab of sample C42 (stained for calcite), a slightly dolomitic/sparry ('matrix') coated grain microsparite, lower member of the Cape Crauford Formation, Jackson Inlet.

D. Close-up of same sample as Plate XII.26C shows coated grains, many with multiple nuclei. Stylolites commonly occur only within the coated grains. As a result, many of the coated grains display internal solution microunconformities. In extreme cases, the outer lamellae of the coated grains have been moved to grain centers by dissolution. Thin section of sample C42 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation, Jackson Inlet.

E. Local rubble breccia with 15 μ m thick residue rims at the boundary between 'clasts' and 'matrix'. 'Clasts' consist mainly of microsparite and range from 2 to 10 mm in size, 55% 'matrix' consists of fine crystalline sparite. Thin section of sample B20 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation, Jackson Inlet.

F. Coated or altered clasts composed of fine crystalline dolomite in which calcified dolomite is common. Medium crystalline limpid dolomite lines pores between coated grains. Sample was taken 4 m below the unconformity between the upper and lower members of the Cape Crauford Formation, Port Bowen. Slab of sample DX11 (stained for calcite). The field appearance of unit DX11 is shown in Plate XII.4B.

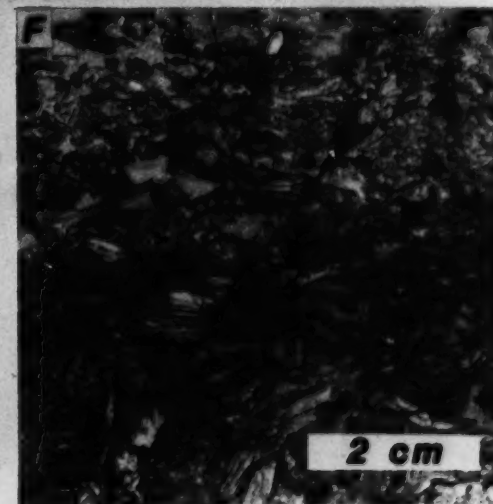
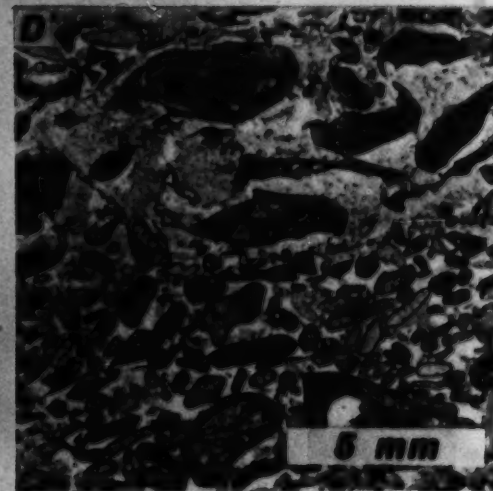
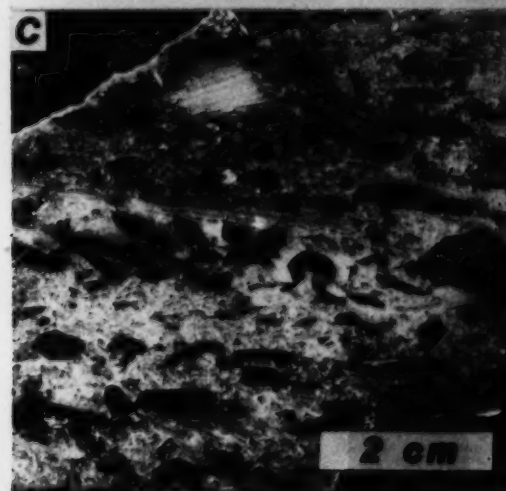
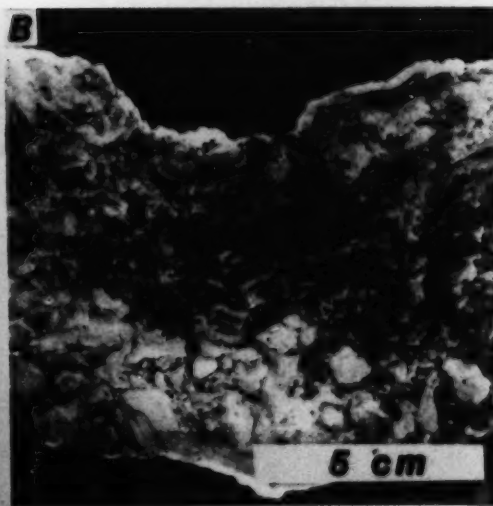


Plate XII.27

A. Articulated brachiopod in dolomitic sparry pelmicrosparite (a). Brachiopod valve (c) is coated with dolomite and lined with alternating dolomitic (d) and (f) and calcitic (e) and (g) cement linings. Thin section of sample E45 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

B. Luminescence of same area as Plate XII.27A showing calcite (orange) and dolomite (magenta). Spar luminesces a uniform orange except for zoned calcite (g).

C. Fluorescence of part of same area as Plate XII.27A showing non-fluorescent calcite (a), (c) and (e), fluorescent calcite (g) and fluorescent dolomite (b), (d) and (f).

D. Apparently homogeneous dolomitic fracture fill (b) and (c) in a mottled brachiopod-bearing medium crystalline dolostone (a). Thin section of sample B6 (stained for calcite), transmitted ordinary light, member B of the Baillarge Formation.

E. Luminescence of same area as Plate XII.27D showing an orange-luminescent zoned dolomite lining (b) and a red luminescent zoned dolomite lining (c).

F. Fluorescence of part of same area as Plate XII.27D and E, showing rare orange-fluorescent scalenohedral dolomite cores (b) and non-fluorescent dolomite lining (c).

G. Spar cement (b) and (c) filling a small vug in dolostone (a). Thin section of sample A90 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

H. Luminescence of same area as Plate XII.27G showing dolomite (a), very dull luminescent-zoned pore-lining spar (b) and zoned pore-filling orange-luminescent spar (c).

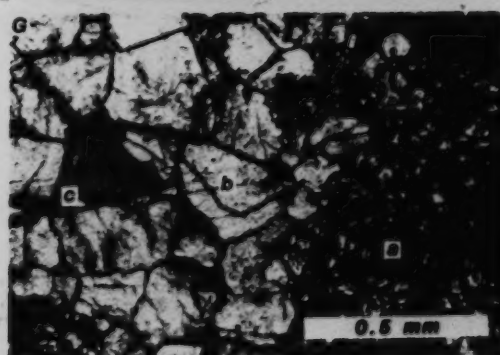
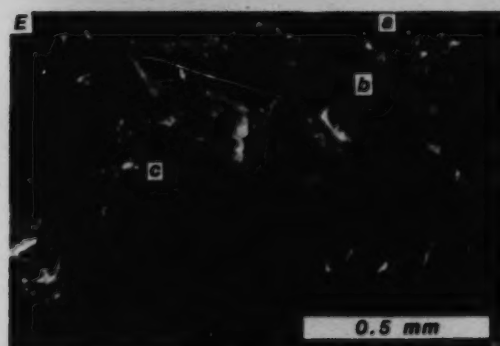
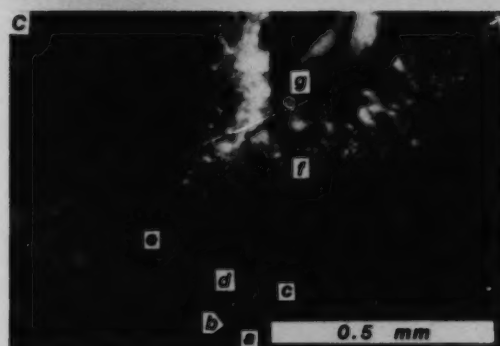
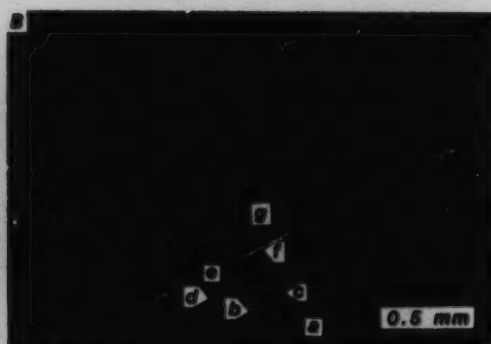
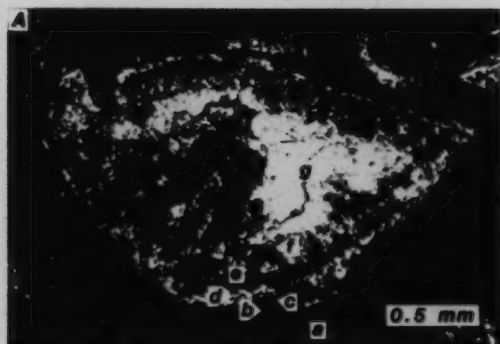


Plate XII.28

A. Vug in fossil-bearing medium crystalline dolostone (a) is lined by spar (b) and (c). Pore space is black. Unstained thin section of sample B15, transmitted ordinary light, lower member of the Cape Crauford Formation.

B. Luminescence of same area as Plate XII.28A showing dolomite (a), non-luminescent spar cores (b) and orange-luminescent-zoned spar (c). Note how thin the luminescent zone is at (d) compared with the corresponding fluorescent zone (Plate XII.28Cd).

C. Fluorescence of part of same area as Plate XII.28A showing fluorescent (b) and non-fluorescent spar (c). Fluorescent zonation is uniformly thick at (d).

D. Monocrystalline quartz (a) and fluorite (b) is concentrated along stylolites in a slightly dolomitic microsparite/ fine crystalline sparite crackle breccia. Thin section of sample C23 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

E. Luminescence of same area as D showing blue-luminescent fluorite (a) in orange-luminescent microsparite/sparite (b).

F. Fluorescence of part of same area as Plate XII.28D and E showing non-fluorescent to cream white fluorescent fluorite (a) in a non-fluorescent microsparite/sparite (b).

G. Dasyclad algae. Thin section of sample C69 stained for calcite, transmitted ordinary light, lower member of the Cape Crauford Formation.

H. Luminescence of same area as Plate XII.28G contains blue-luminescent fluorite (pseudomorphic after dolomite) (a) and yellow luminescent spar cement (b).

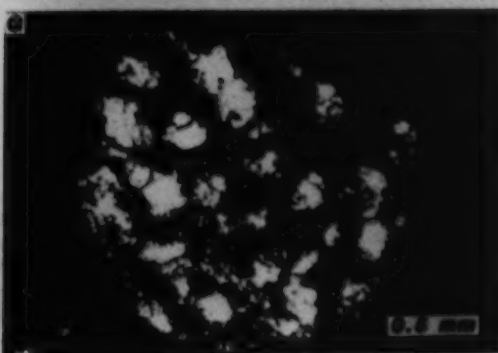
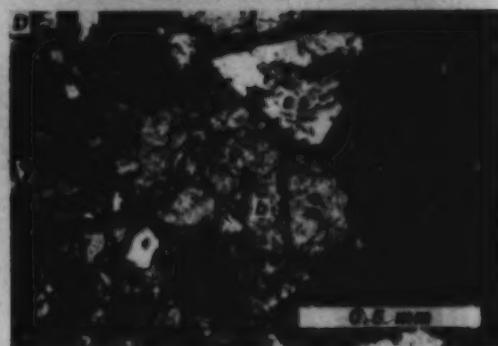
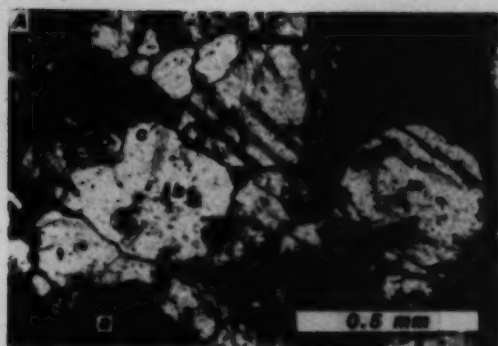


Plate XII.29

A. Dolomitic/fluoritic 'matrix' (a) with minor porosity near (b) between breccia clasts (c) and (d). Thin section of sample D28 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

B. Luminescence of same area as Plate XII.29A. Blue-luminescent fluorite (a) which is pseudomorphic after rhombic carbonate is concentrated in the 'matrix'. Orange luminescent calcite overgrowths (b) occur on spar lining a vug. Two uniformly luminescent dolomitic breccia clasts occur at (c) and (d).

C. Dolomitic ooids in spar. Some grains (a) have a distinct coating (b). Thin section of sample G23 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

D. Luminescence of same area as Plate XII.29C showing non-luminescent grain (a) with dull luminescent dolomitic overgrowth (b). Except for orange luminescent spar (c) which is pseudomorphic after gypsum, spar is not luminescent.

E. Spar (a) fills pores formed by leaching of calcified dolomite rhombs (b). This part of the thin section is from the spar-rich rim of the breccia clast shown in Plate XII.23Db. Pore space is filled with blue epoxy. Thin section of sample DX2 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

F. A calcified dolomite core (a) has been leached in a dolomite rhomb (b) from the central part of the breccia clast shown in Plate XII.23Da. Note that porosity formed by leaching of calcified dolomite is extensive. Thin section of sample DX2 (stained for calcite), transmitted ordinary light.

G. Luminescence in the crackle to mosaic breccia of sample H11. Blue-luminescent fluorite (a) and orange-luminescent spar (b) are concentrated along a subvertical fracture. Zoned orange-luminescent spar (c) fills vugs between breccia clasts (d). Thin section of sample H11 (stained for calcite), lower member of the Cape Crauford Formation.

H. Luminescence showing zoned pseudomorphic fluorite after euhedral rhombic dolomite (a) in orange-luminescent microsparite to fine crystalline sparite crackle breccia (b). Thin section of sample C23, lower member of the Cape Crauford Formation.

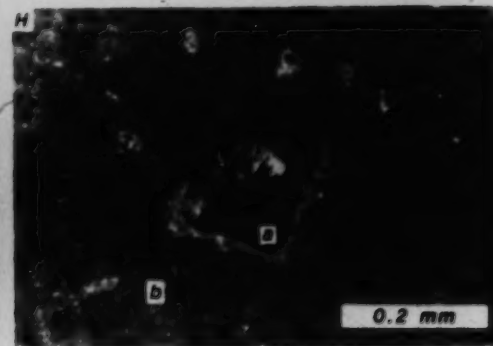
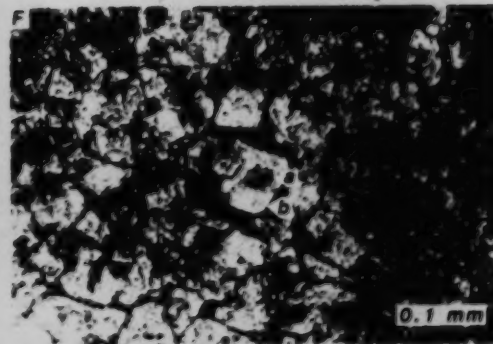
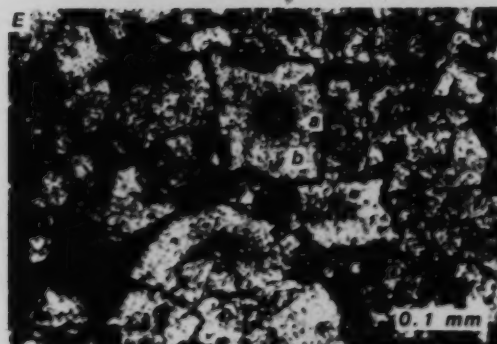
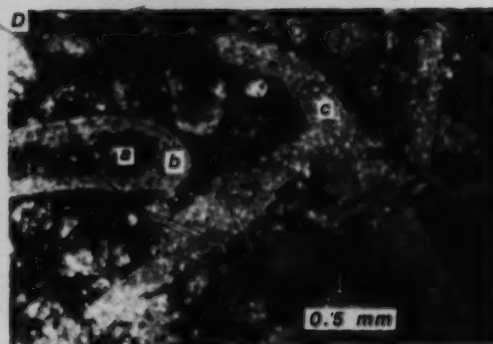
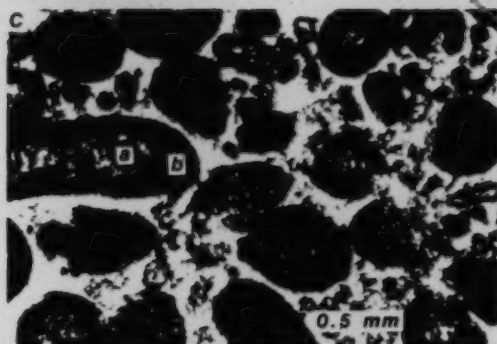
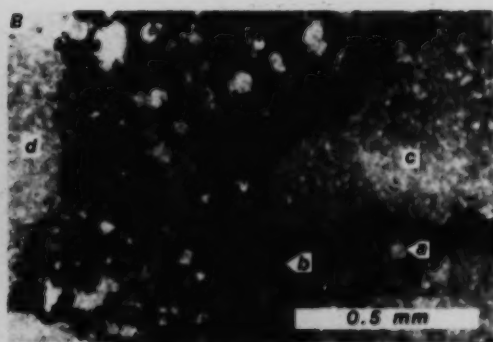
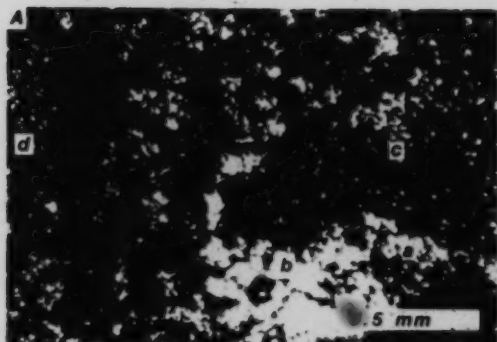


Plate XII.30

A. Spar-filled ostracod (a) truncated by stylolite (b) in a mottled dolomitic ostracodal biomicrosparite. Thin section of sample E1 (unstained), transmitted ordinary light, member B of the Baillarge Formation.

B. Fluorescence of same area as Plate XII.30A showing fluorescent-zoned spar cement (a) filling an ostracod.

C. Dolomitic pelmicrosparite with irregular sparry area (a). Thin section of sample E33 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

D. Luminescence of same area as Plate XII.30C showing orange-luminescent pseudomorphic spar after anhydrite (a). Pseudomorphs occur along orange-luminescent fractures (b) and (c). Elsewhere spar and dolomite are non-luminescent (d).

E. Gypsum crystal pseudomorph of composite microspar (a) is offset by a stylolite (b) in a slightly sparry, slightly micritic microsparite. Thin section of sample E74, transmitted ordinary light, lower member of the Cape Crauford Formation.

F. Mosaic to rubble breccia with microsparite breccia clasts (a) lined with spar cement (b) and (c). Pore space (d) is dark. Thin section of sample J45, transmitted ordinary light, lower member of the Cape Crauford Formation.

G. Luminescence of same area as Plate XII.30F. The single spar cement crystal in F is resolved into a non-luminescent spar core (b) and a zoned orange-luminescent spar overgrowth (c).

H. Fluorescence of part of same area shown in F and G with corresponding areas indicated by letters (a) to (d). White fluorescent spar zones correspond with bright luminescent zones in G.

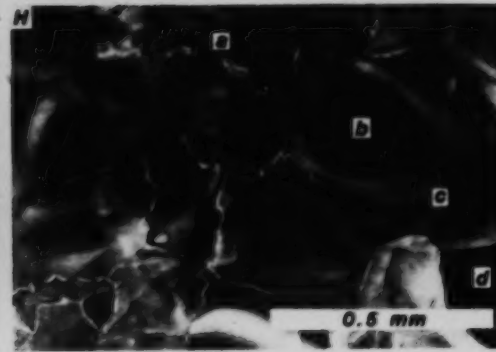
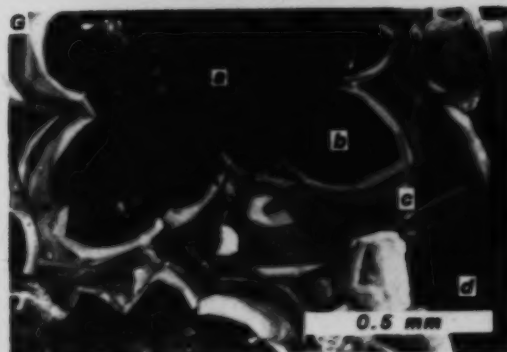
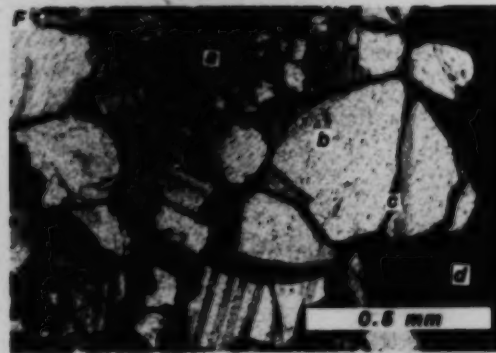
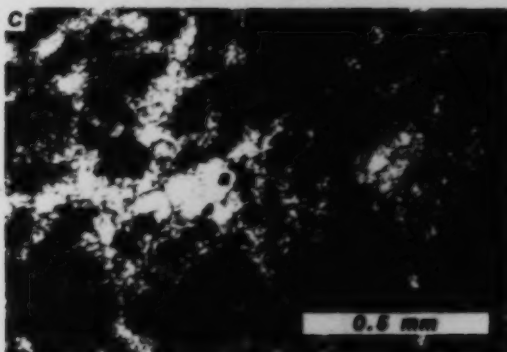
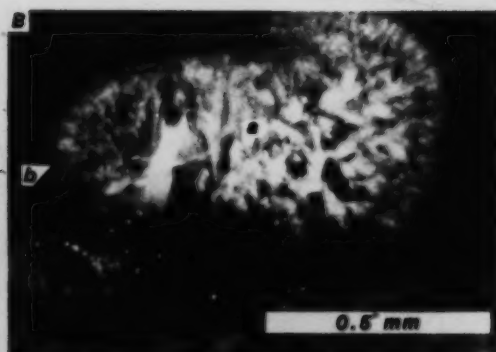


Plate XII.31

A. Spar (a) filling vug in mottled ostracodal fine to medium crystalline dolostone. Thin section of sample C2 (stained for calcite), transmitted ordinary light, member B of the Baillarge Formation.

B. Fluorescence of same area as Plate XII.31A showing spar with a non-fluorescent core (a) and a zoned fluorescent rim (b).

C. Breccia clasts (a) and (b) are difficult to differentiate from spar-rich cement (c) in ordinary transmitted light. Thin section of sample E25, a dolomitic/sparitic microsparite 'clast' crackle breccia, lower member of the Cape Crauford Formation.

D. Luminescence of same area as Plate XII.31C showing breccia clasts (a) and (b) (dark) distinct from luminescent cement (c).

E. Coated grain of micritic microspar to fine crystalline spar (a) has been crushed at (b). Thin section of sample H16, transmitted ordinary light, lower member of the Cape Crauford Formation.

F. White fluorescent dolomite (a) is concentrated in a collapsed coated grain. Coating (b) and (c) consists of dull white fluorescent microspar. Microspar (d) between coated grains is non-fluorescent. Thin section of sample C42 (stained for calcite), lower member of the Cape Crauford Formation.

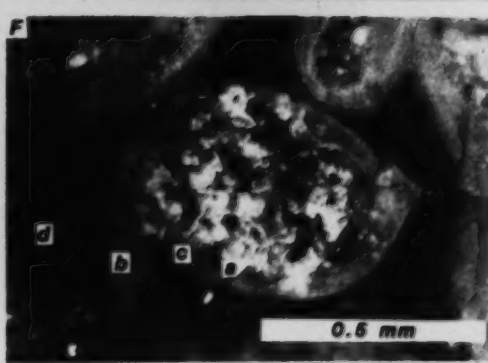
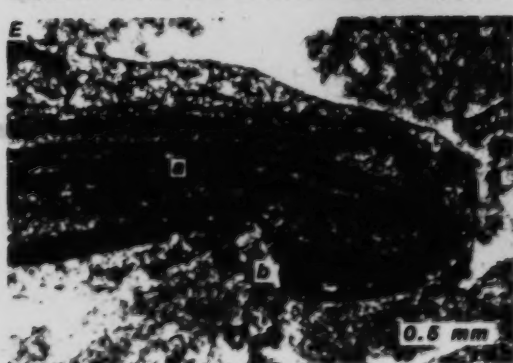
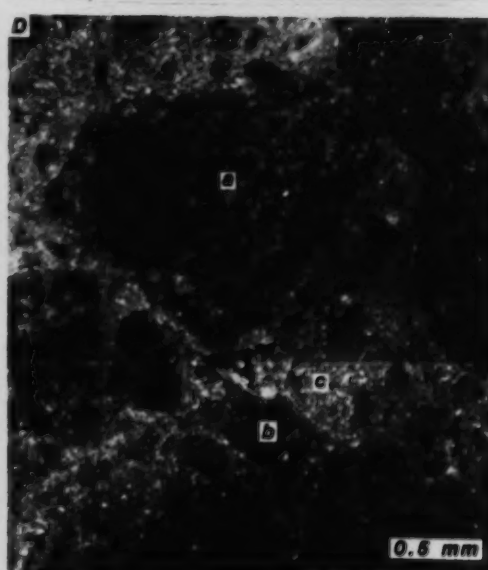
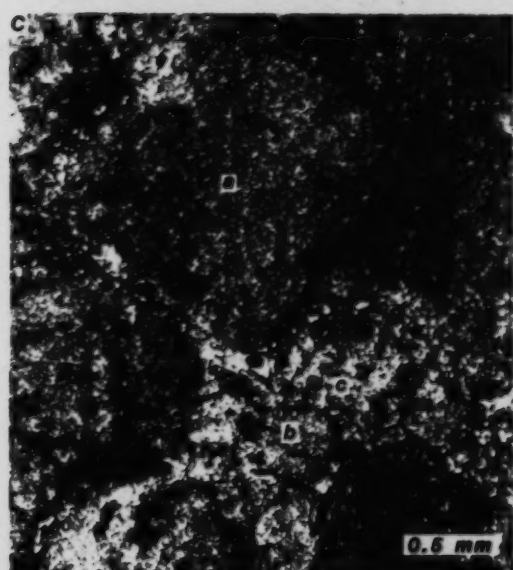
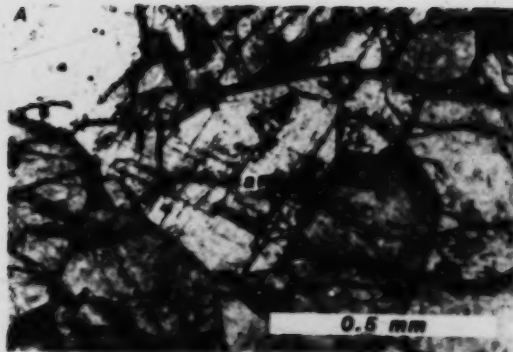


Plate XII.32

A. Peloids (a) and microspar to spar cement (c) in a slightly dolomitic ostracodal biosparite. Thin section of sample H47 (stained for calcite), unit B of the upper member of the Cape Crauford Formation.

B. Fluorescence of same area as Plate XII.32A shows peloids (a), isopachous white fluorescent spar cement coatings (b) and non-fluorescent spar cement (c). This sample has extensive clast mouldic porosity.

C. Brecciated clast (a) and (c) is separated by spar cement (b) in a sparite mosaic breccia. Thin section of sample J46, transmitted ordinary light, lower member of the Cape Crauford Formation (see also Plate XII.23B).

D. Luminescence of same area as Plate XII.32C. The leached breccia clast (a) and (c) contains abundant yellow luminescent overgrowths on spar and the cement (b) luminesces dull red.

E. Spar (a) and (b) lines a fracture in dolomitic sparry ostracodal biopelmicrosparite (c). Thin section of sample E42d, transmitted ordinary light, lower member of the Cape Crauford Formation.

F. Luminescence of same area as Plate XII.32E showing orange-luminescent zoned spar (a) and (b) on each side of the fracture. Note the complex zonation and crystal enlargement away from the walls of the fracture.

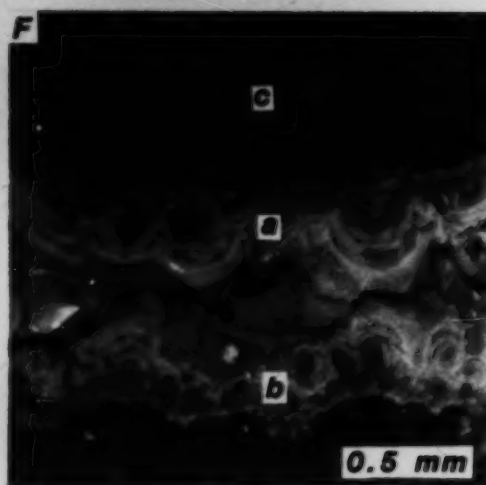
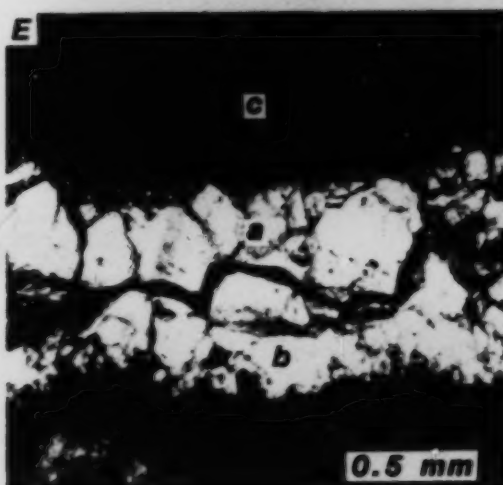
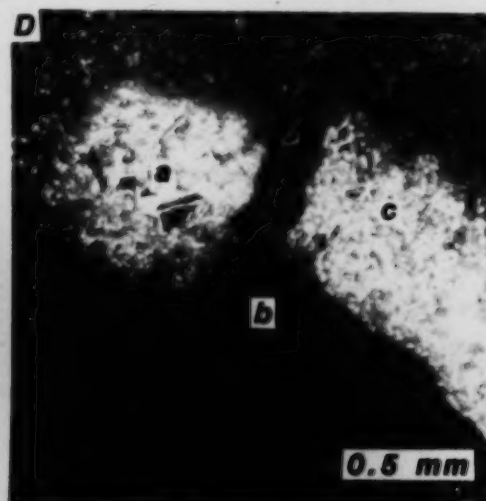
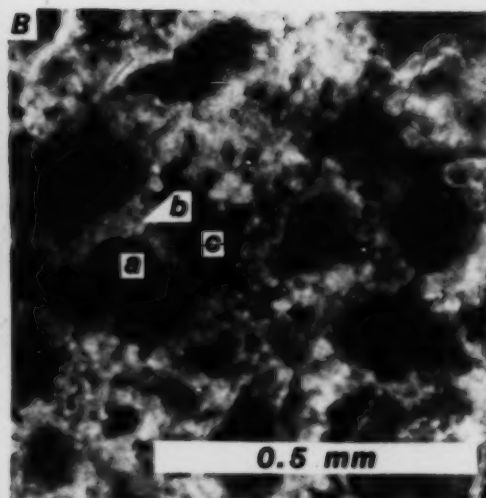


Plate XII.33

A. Dolomitic ossicle (a) with a dolomitic syntaxial overgrowth (b) in a peloidal/sparry/fossiliferous fine crystalline dolostone. Thin section of sample K4 (stained for calcite), transmitted ordinary light, member B of the Baillarge Formation.

B. Luminescence of same area as Plate XII.33A. The dolomitic ossicle (a) is non-luminescent except for dull red luminescent calcite filling microporosity in the ossicle. The dolomitic syntaxial overgrowth (b) is non-luminescent. Dolomite (c) is red-luminescent and occurs in a very dull luminescent groundmass of spar.

C. Fluorescence of part of same ossicle in Plate XII.33C showing a non-fluorescent ossicle (a) overgrown by white fluorescent dolomite (b). Dolomite fluoresces a dull white (c).

D. Fine crystalline spar (a) in space formerly occupied by gypsum. The presence of former gypsum is now represented by porous very fine crystalline dolostone (b) in a relatively non-porous very fine crystalline dolostone (c). Thin section of sample A87 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

E. Luminescence of same area as Plate XII.33D showing orange-luminescent calcite overgrowths on non-luminescent spar cores (a) and dull red luminescent dolomite (b) and (c).

F. Fluorescence of part of same area as Plate XII. 33D and E showing dull white fluorescent spar (a) and white fluorescent dolomite (b) and (c).

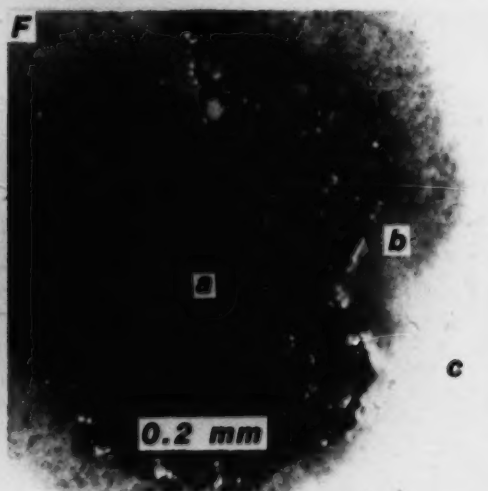
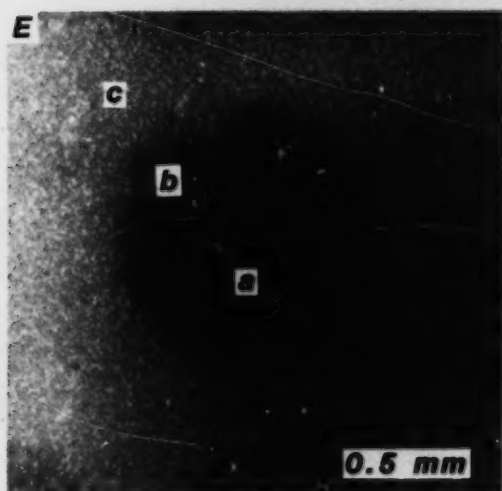
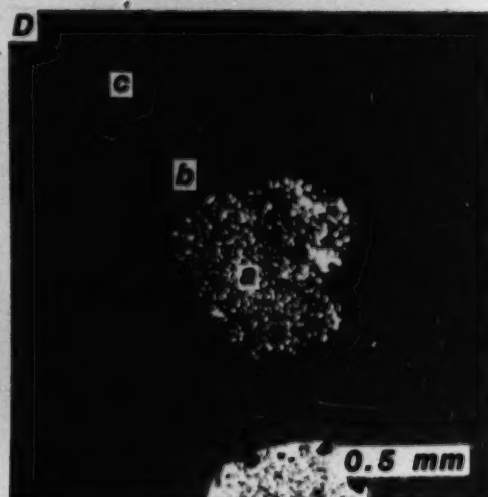
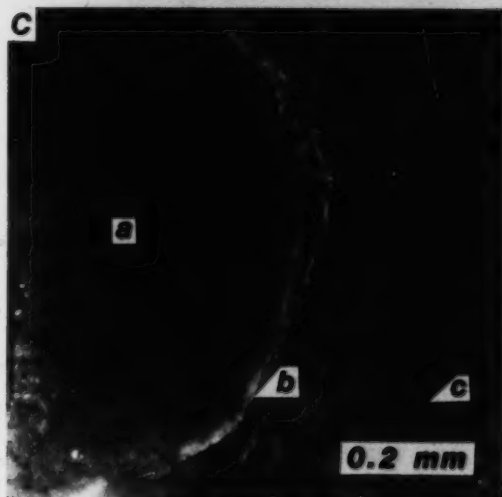
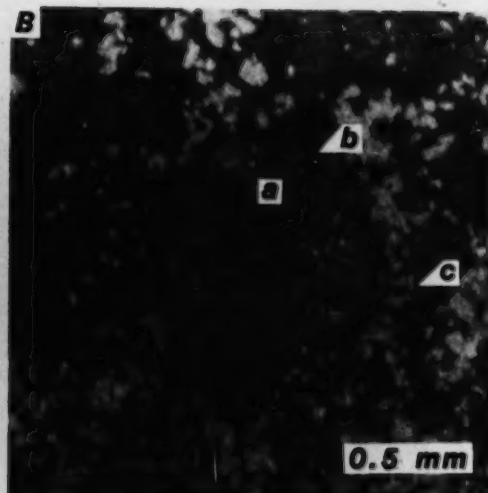


Plate XII. 34

A. Peculiar asymmetric rhombic growth form of dolomite (a) in biopelsparite (b). Thin section of sample K5 (stained for calcite), transmitted ordinary light, member B of the Baillarge Formation.

B. Irregular elongate growth form of dolomite (a) in microsparite (b). Thin section of sample E45 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

C. Lath-shaped growth form of dolomite (a) in microsparite (b) has been partly calcified. Thin section of sample E42d (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

D. Extensively calcified dolomite (a) replaces dolomite cores (b). Thin section of sample H48 (stained for calcite), transmitted ordinary light, unit B of the upper member of the Cape Crauford Formation.

E. Calcified dolomite (a) replaces the outer part of a dolomite rhomb (b). Calcification is extensive in the vicinity of (c) where only relict dolomite remains. Thin section of sample D21 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

F. Spar (in part calcified dolomite) occurs at (a), dolomite at (b), pore space at (c) and leached calcified dolomite is present near (d). Thin section of sample C29 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

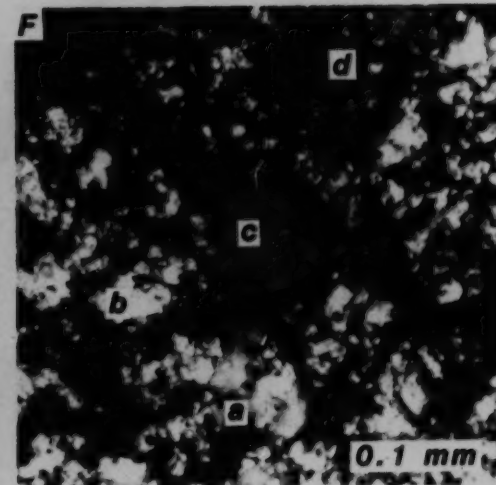
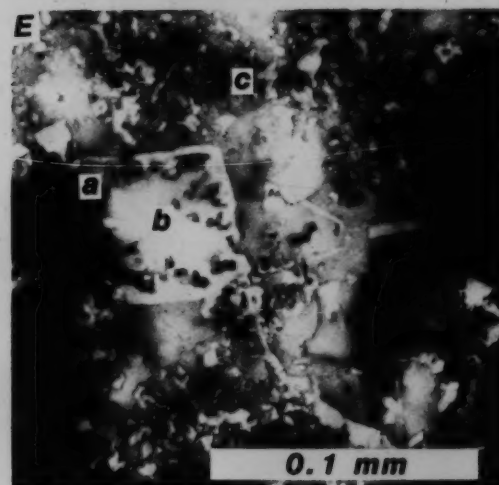
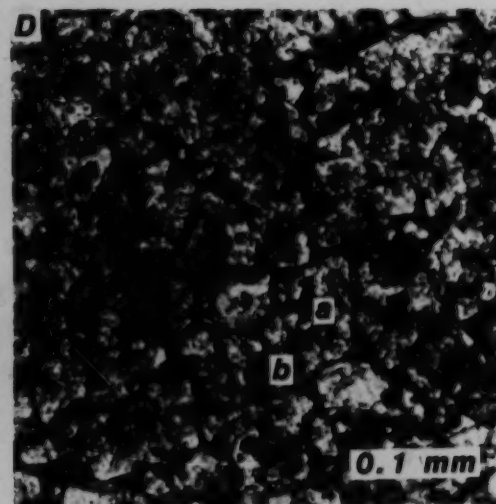
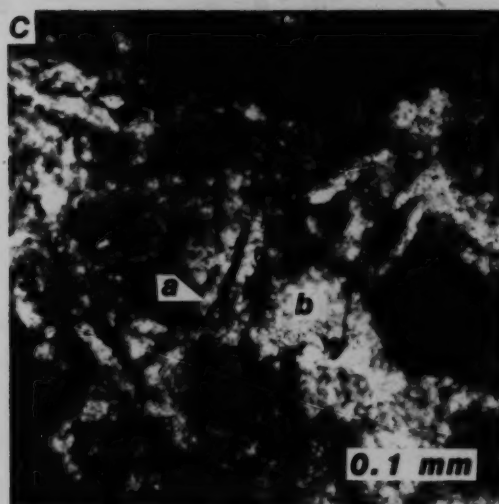
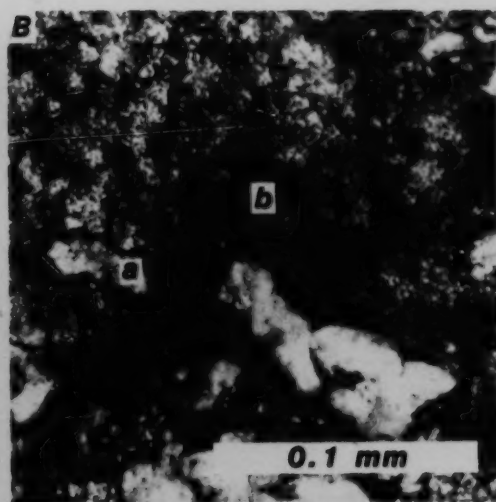
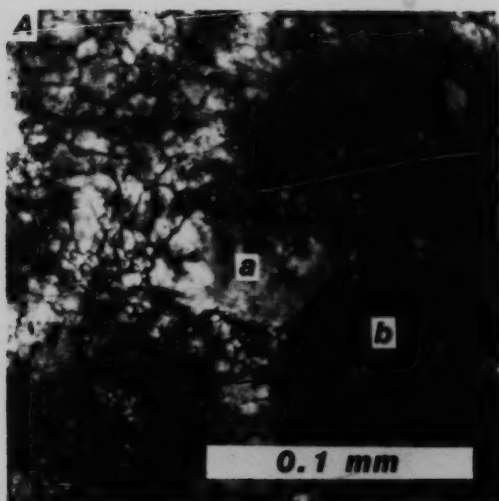


Plate XII.35

A. Spar along a subvertical fracture (a) terminates at stylolite (b) in a mosaic to rubble breccia. Clasts of dolomitic slightly ostracodal pelmicrosparite occur in a sparite 'matrix'. Thin section of sample G35 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

B. Luminescence of same area as Plate XII.35A, showing orange-luminescent spar along a fracture (a) that terminates at a stylolite (b). Dolomite (c) luminesces red.

C. Fluorescence of part of area shown in Plate XII.35A and B. Peloids have an isopachous white fluorescent spar coating. Non-fluorescent spar cement fills space between the spar coated peloids. Non-fluorescent spar cement also occurs along the fracture (a) that terminates at the stylolite (b).

D. High-amplitude stylolites (a) in a coated grain microsparitic pelsparite. Note the isolated parts of stylolites at (b) and (c). Thin section of sample C71 (stained for calcite), transmitted ordinary light, lower member of the Cape Crauford Formation.

E. Luminescence of same area as Plate XII.35D. Yellow-orange luminescent spar occurs along fractures (a) and (b) that terminate at the stylolite (c). Yellow-orange luminescent spar is also present along some of the stylolitic columns (d).

F. Fluorescence of the upper left part of the area shown in Plate XII.35D and E. Material along the columns of the stylolites fluoresce white (b).

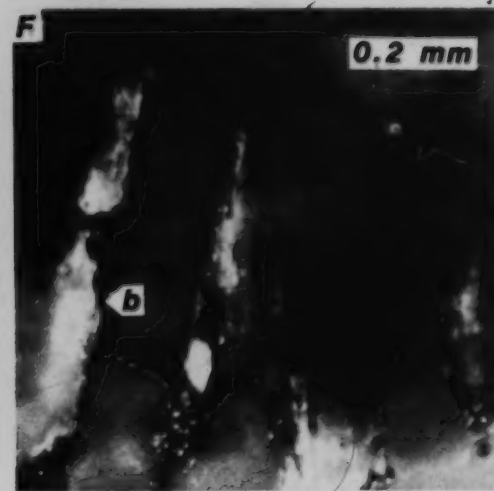
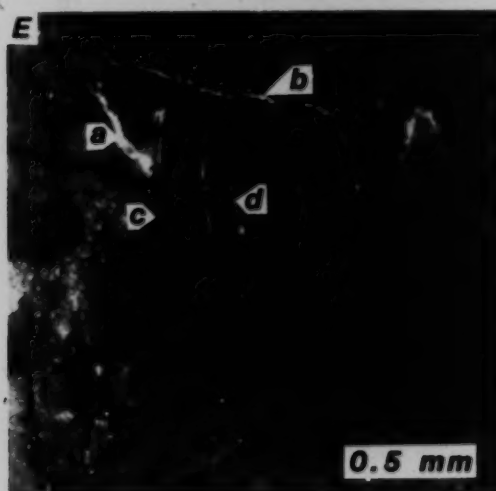
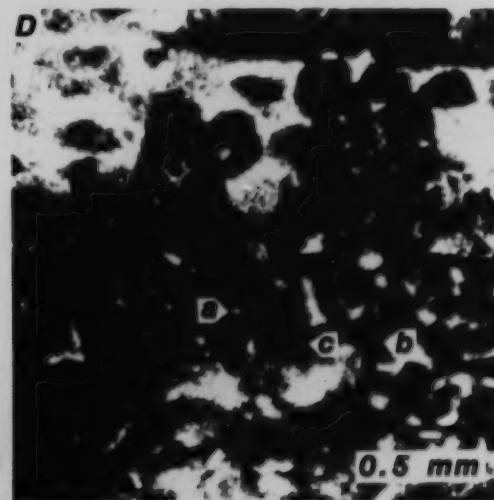
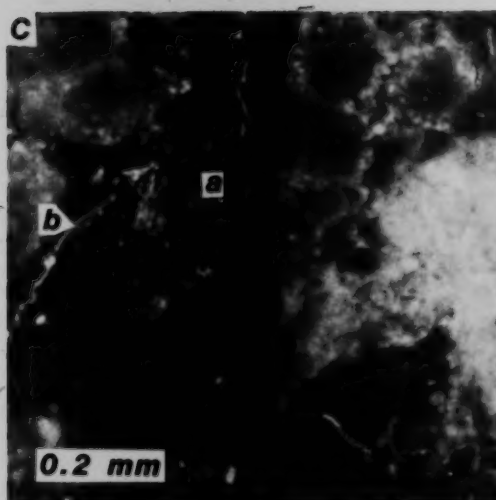
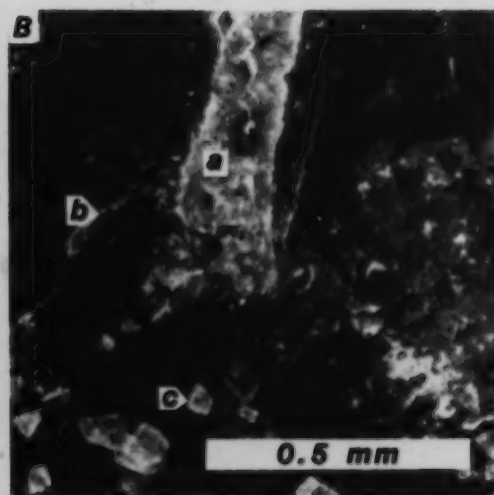
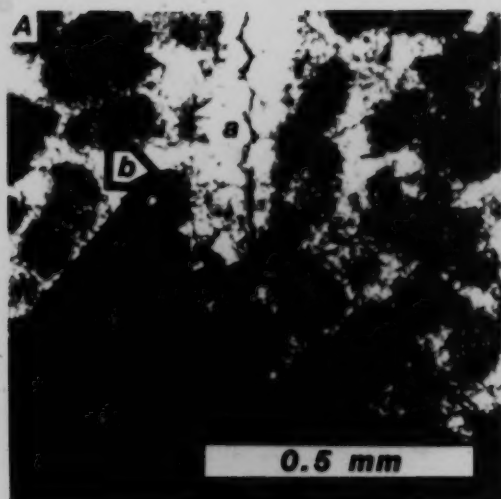


Plate XII.36

A. Slightly dolomitic ostracodal biomicrosparite contains light coloured areas of relatively pure carbonate (a) and darker areas with relatively high concentrations of non-carbonate (b). Thin section of sample C22, transmitted ordinary light, lower member of the Cape Crauford Formation.

B. Fluorescence of same area as Plate XII.36A. Many of the light-coloured areas in transmitted light in Plate XII.36A are dull fluorescent (a) and many of the dark-coloured areas in transmitted light are relatively bright fluorescent (b).

C. Subvertical spar veinlet (a) in a cross-laminated slightly dolomitic and microsparitic fine crystalline sparite. Thin section of sample D8, transmitted ordinary light, member B of the Baillarge Formation.

D. Luminescence of same area as Plate XII.36C. The subvertical spar veinlet (a) is non-luminescent. However, luminescence reveals a subvertical bright orange-yellow luminescent spar veinlet (b) that is not visible in transmitted ordinary light.

E. A complex fluorescent-zoned pore-filling spar (a). Thin section of sample A90 (stained for calcite), lower member of the Cape Crauford Formation.

F. Fluorescent spar cement (a) fills vugs and an ostracod mould in ostracodal biopelmicrosparite (b). Thin section of sample E61, lower member of the Cape Crauford Formation.

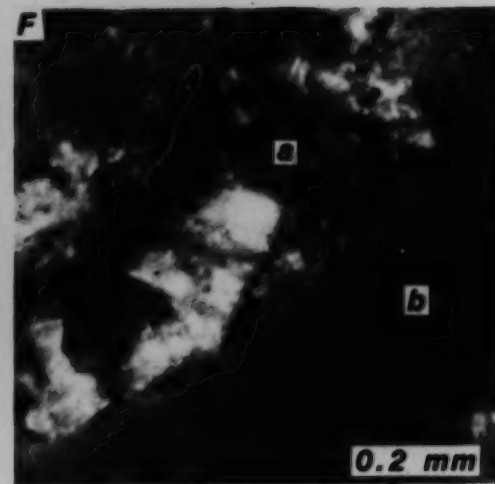
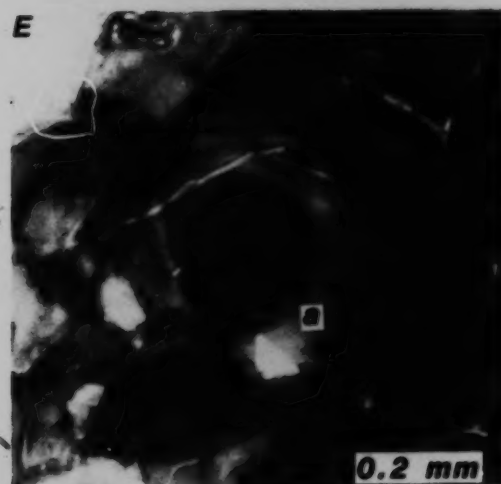
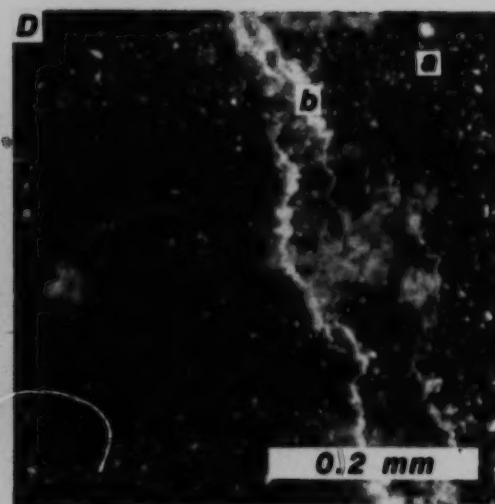
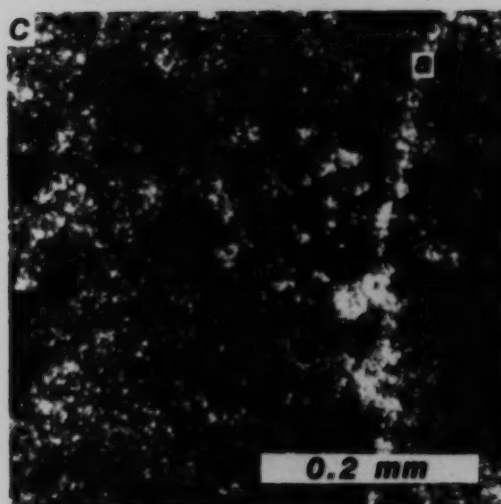
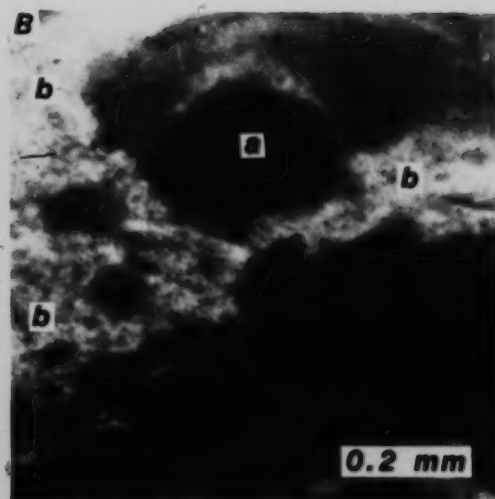
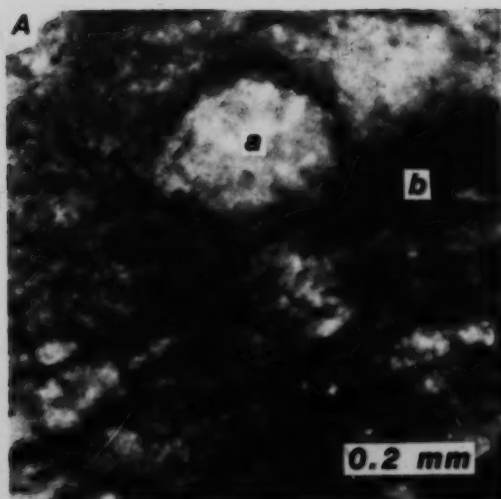


Plate XII.37

A. Vug-filling quartz (a) in mosaic to rubble breccia. Dark areas (b) and (c) are inclusion-rich zones. Thin section of sample J45, transmitted ordinary light, lower member of the Cape Crauford Formation.

B. Luminescence of same area as Plate XII.37A, showing non-luminescent quartz (a) with dull red-luminescent inclusion-rich zones. Micrite to spar (b) luminesces a dull red.

C. Fluorescence of part of same area as Plate XII.37A and B, showing non-fluorescent quartz (a) with dull white fluorescent inclusion-rich zones.

D. Spar (a) and dolomite (b) fill a vug in a fossiliferous/sparry fine to medium crystalline dolostone (c). Thin section of sample G39a (stained for calcite), transmitted ordinary light, upper member of the Cape Crauford Formation.

E. Luminescence of same area as D, showing non-luminescent spar (a) and zoned bright red-luminescent dolomite (b) in dull luminescent dolostone (c).

F. Fluorescence of part of same vug shown in Plate XII.37D and E. Spar at (a) fluoresces dull white but the dolomite lining (b) is non-fluorescent.

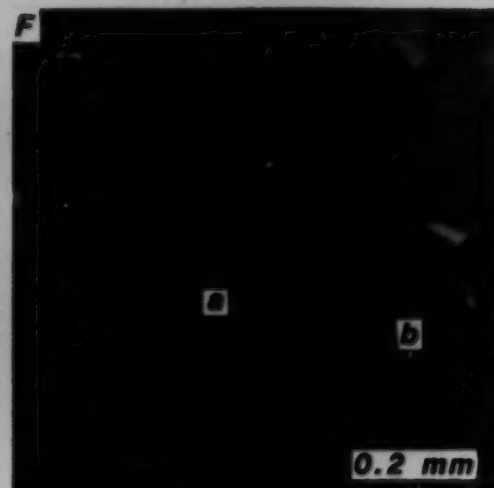
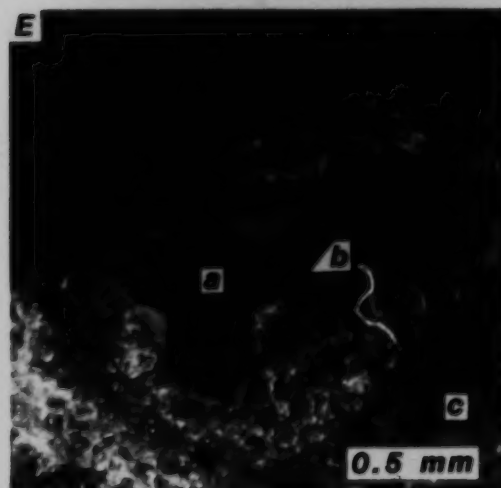
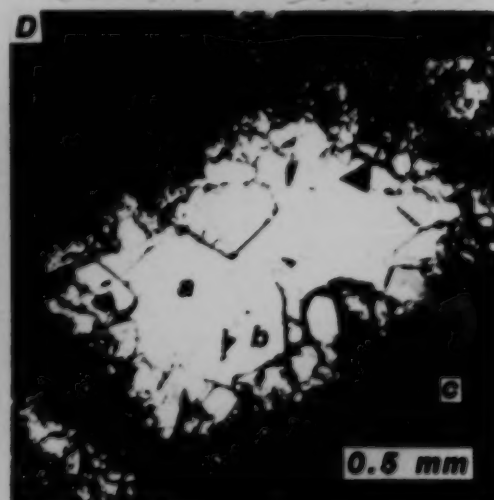
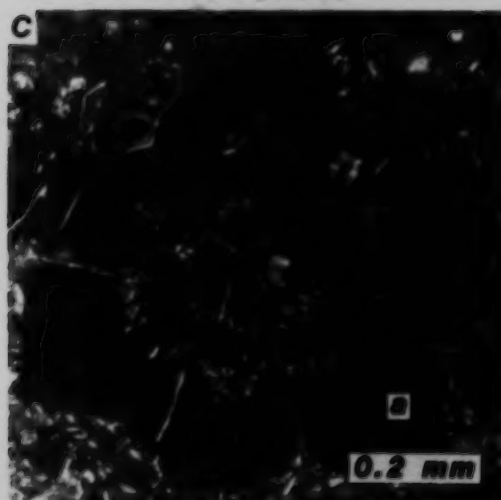
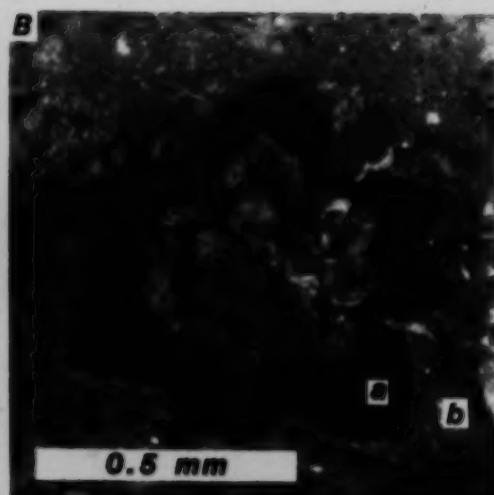


Plate XII.38

- A. Spar cement (a) and (b) between breccia clasts in a mosaic to rubble breccia. Thin section of sample G35, transmitted ordinary light, lower member of the Cape Crauford Formation.
- B. Luminescence of same area as Plate XII.38A showing bright yellow-orange-luminescent cement zones (a) and (b).
- C. Fluorescence of left center area in Plate XII.38A and B. Note non-fluorescence (a) and thin dull-white fluorescent zones (b). The fluorescent zone in (b) does not correlate with the luminescent zones in (b) of Plate XII.38B.
- D. Cement-filling spar (a), thin section of sample J45, transmitted ordinary light, lower member of the Cape Crauford Formation.
- E. Luminescence of same area as Plate XII.38D showing a non-luminescent core (a) with an extremely complex yellow-orange zoned overgrowth (b) and (c).
- F. Fluorescence of same area as Plate XII.38D and E showing a non-fluorescent core (a), a white fluorescent zone (b) and a non-fluorescent outer zone (c).

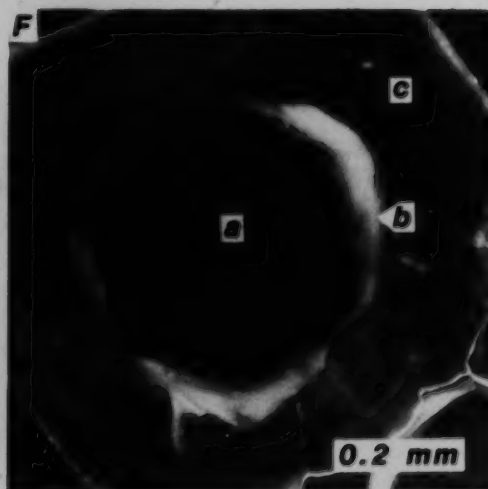
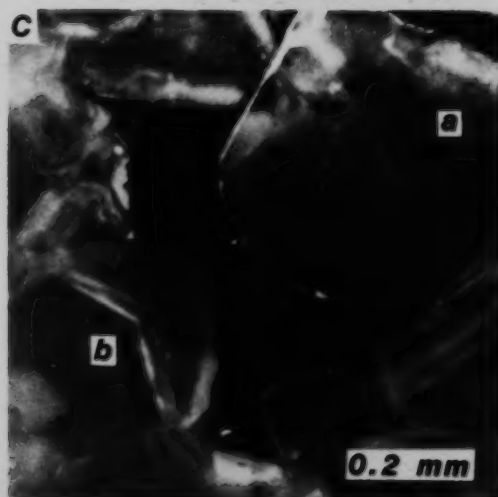
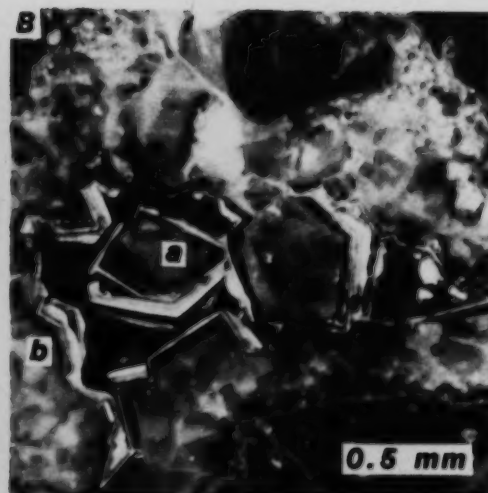
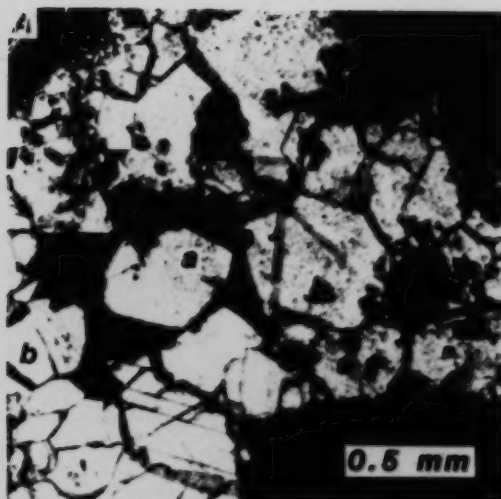


Plate XII.39

A. Ossicle (a) in a dolomitic mottled sparry/micritic biomicrosparite. Calcareous area at (b) and part of a dolomitic mottle is shown at (c). Thin section of sample L3 (stained for calcite), transmitted ordinary light, member B of the Baillarge Formation.

B. Luminescence of same area as Plate XII.39A reveals a dull orange-luminescent ossicle (a) in a uniformly orange-luminescent microspar (b). Dolomite in the dolomitic mottle (c) is red luminescent.

C. Breccia clast (a) in a sparry biomicrosparite crackle breccia. Thin section of sample E77, transmitted ordinary light, lower member of the Cape Crauford Formation.

D. Luminescence of same area as Plate XII.39C showing a breccia clast (a) that is itself composed of either pseudobreccia or true breccia. Microspar and spar between breccia clasts is orange-luminescent.

E. Luminescence of a dolomitic/intraclastic/ stromatolitic pelmicrosparite showing intraclast (a) containing minor blue-luminescent detrital quartz (b). Blue-luminescent detrital quartz (c) is present between the intraclasts. Thin section of sample N10a, transmitted ordinary light, member A of the Baillarge Formation.

F. Calcified dolomite as composite microspar after euhedral dolomite (a) apparently containing a later generation dolomite (b) and (c). Thin section of sample I7 (stained for calcite), transmitted ordinary light, member B of the Baillarge Formation.

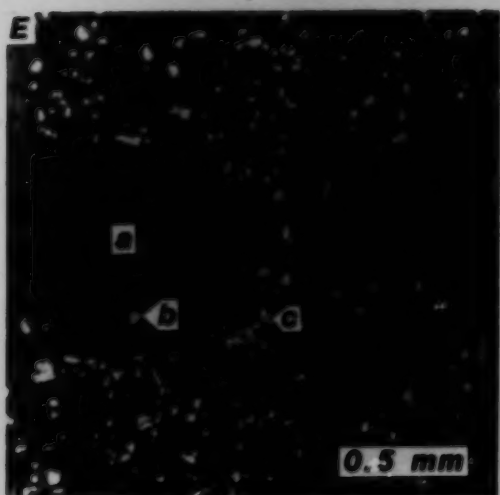
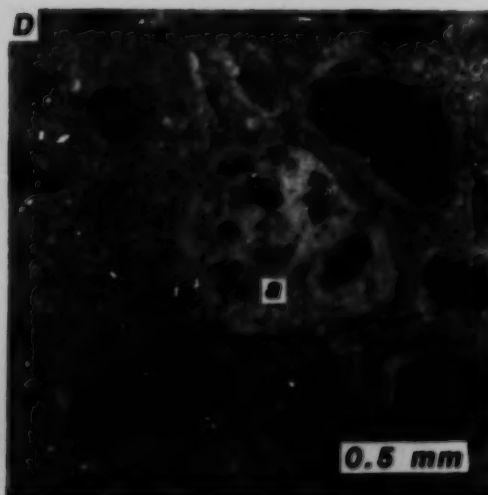
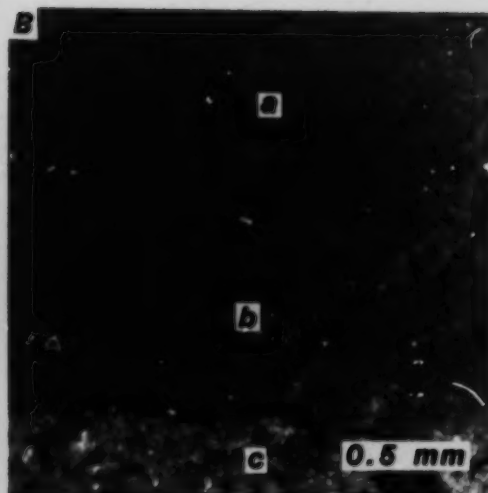
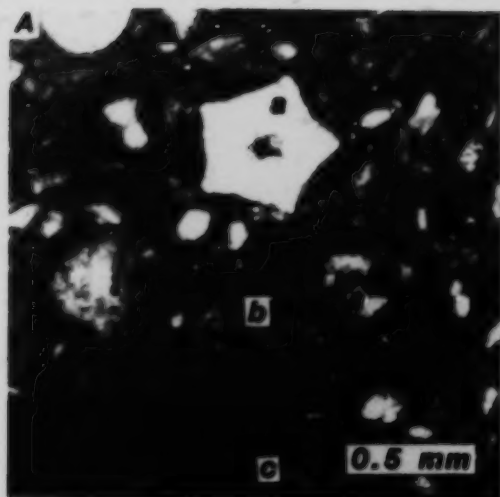


Plate XII.40

A. Inclusion-free spar (a) and an inclusion-rich microspar (b) in a mottled dolomitic ostracodal biopelmicrosparite. Thin section of sample H50, transmitted ordinary light.

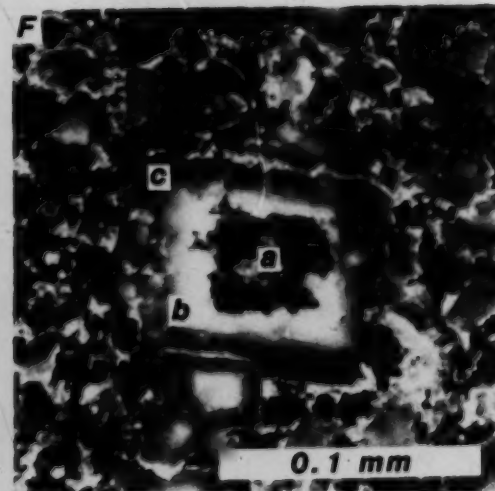
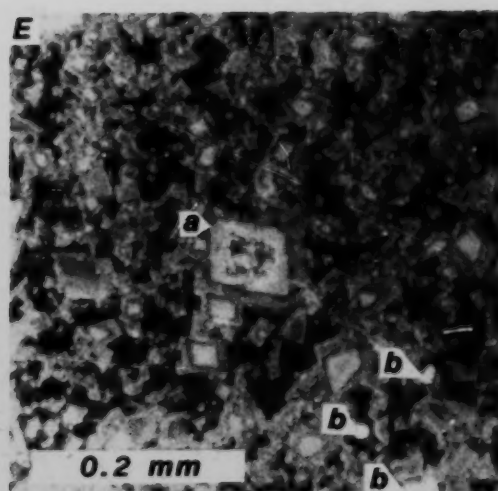
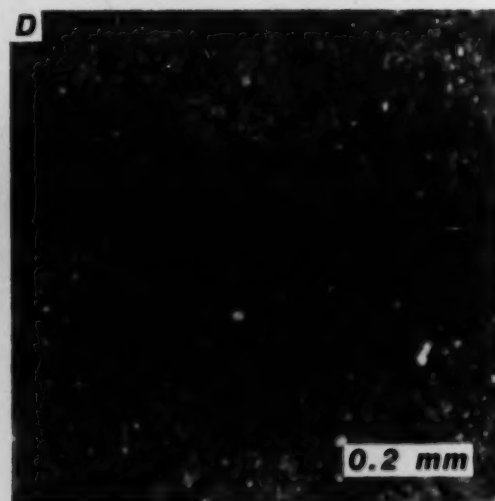
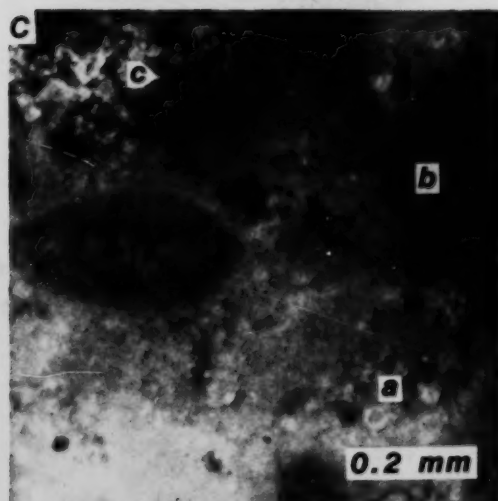
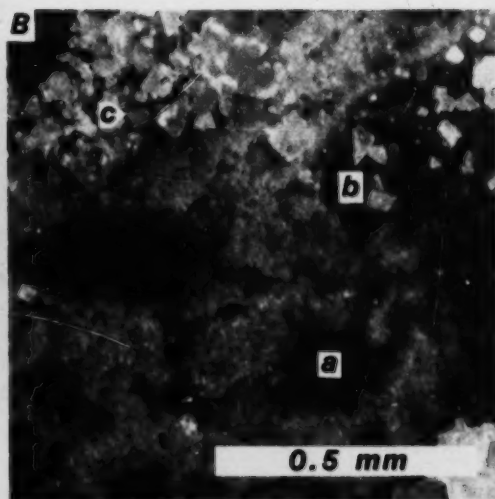
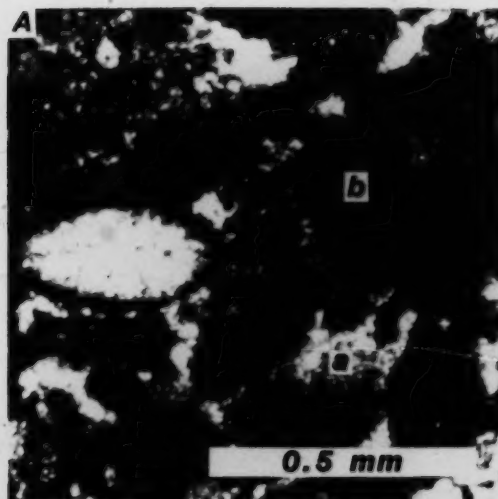
B. Luminescence of same area as Plate XII.40A showing dull luminescent clear spar-rich areas (a). The area in the vicinity of (b) is dull-luminescent even though the same area in ordinary transmitted light is uniformly dark. Red luminescent dolomite is present at (c).

C. Fluorescence of part of same area as Plate XII.40A and B, showing white fluorescent spar (a), an anomalously non-fluorescent area (b) and white fluorescent dolomite (c).

D. Fluorescence accentuates cross-lamination in a microsparitic/ argillaceous interlaminated fine grained dololutite and dolarenite. Thin section of sample N5 (stained for calcite), transmitted ordinary light (see also Plate XII.40E and F). Member A of the Baillarge Formation.

E. Luminescence of sample N5, showing zoned red luminescent dolomite. Relict broken corners in dolomite rhombs (a) were probably formed by abrasion. Detrital blue-luminescent quartz grains are present at (b).

F. Fluorescence of central area shown in Plate XII.40D showing calcified dolomite (a) replacing the bright yellow-white fluorescent core (b) of a dolomite rhomb (c).



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THE UNIVERSITY OF ALBERTA

STRATIGRAPHY AND SEDIMENTOLOGY OF THE ORDOVICIAN AND SILURIAN
BRODEUR GROUP, NORTHERN BRODEUR PENINSULA, BAFFIN ISLAND

by

FRANZ WERNER NENTWICH

APPENDICES

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF GEOLOGY

EDMONTON, ALBERTA

FALL 1987

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XIII. APPENDIX 1, ABBREVIATIONS USED IN THE APPENDICES

aa.....as above
 abu.....above the base of the unit
 ang.....angular
 approx...approximate(ly)
 argil....argillaceous
 asl.....above sealevel
 brach....brachiopod
 c.....coarse(ly)
 calc....calcareous
 carb....carbonaceous
 CL.....cathodoluminescence
 com.....common(ly)
 dk.....dark
 est.....estimated
 f.....fine(ly)
 FLUOR....fluorescence
 frag....fragment
 FS.....fresh surface
 gn.....grain(ed)
 in.....intense
 indet....indeterminate
 interxyn.intercrystalline
 lam.....laminated, lamination
 litho....lithology
 ls.....limestone
 lt.....light
 m.....medium
 mat'l....material
 max.....maximum
 min.....minimum
 misc....miscellaneous
 NA.....not applicable
 prom....prominent
 rd.....round(ed)
 rec.....recessive
 rep.....representative
 sbang....subangular
 sbrd....subrounded
 sl.....slightly
 st.....strong
 tr.....trace
 trans....transitional
 vdk....very dark
 vlt....very light
 vst....very strong
 vwk....very weak
 w/.....with
 wk.....weak
 wrt.....with respect to
 WS.....weathered surface
 xdk....extremely dark
 xlt....extremely light
 xtal....crystal
 xyn....crystalline

XIV. APPENDIX 2, FIELD AND SAMPLE DESCRIPTIONS FOR SECTIONS MEASURED ON BRODEUR PENINSULA, 1982-84.

A. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION A, MEASURED IN 1982.

Locality: East end Jackson Inlet.

Latitude: 73°16'50"N.

Longitude: 88°34'00"W.

Base of section Aa, within member B of the Baillarge Formation, approx 10 m asl.

Section Aa start is at lat. 73°16'46" N, long. 88°34'18"W. Section Aa end is at lat. 73°16'53" N, long. 88°34'12"W. Base camp for sections A, B and C is at lat. 73°17'19" N long. 88°35'24"W.

UNIT A1. Sub-section Aa, west side of stream cut valley.

Weathering Character prom. Colour WS m brownish grey. FS lt brownish grey. Basal Contact not exposed. Bedding Character lams <1 cm thick, dk, locally very vuggy w/ spar lining vugs, planar to wavy bedding. Composition calc dolostone, xtal size 0.2 mm. A1 Sample/Slab Description (of main litho). fresh surface colour; wk vlt yellowish-orange (10YR 7/2), misc; fractured to sl brecciated, 100% favositid coral, corallites filled w/ 20µm spar, corallites in part collapsed, vugs to 10 mm. Rock Name: favositid microsparite/sparite crackle breccia. A1a Sample/Slab Description (of spar in vugs), fresh surface colour; wk vlt orangy-yellow (10YR 7/2) and grey (10YR 5/0), 70% microspar, 20% spar, vugs lined w/ spar to 0.4 mm in size, sample porosity includes 10% vugs to 10 mm in size, some of which resemble gypsum xtal moulds. Rock Name: vuggy microsparite.

BASE OF UNIT 0.00 TOP OF UNIT 0.30 THICKNESS 0.30

UNIT A2. Weathering Character prom. Colour WS chalky lt grey. FS lt-m grey. Basal Contact abrupt planar to wavy. Bedding Character planar lam. Bed/Lam Thickness min 1 cm, max 4 cm, mode 2 cm. Composition ls, xtal size 0.1 mm. Sedimentary Structures low- and high-amplitude stylolites. A2 Sample/Slab Description (of main litho) fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; low-amplitude wavy stylolites, composition; 90% f xyn (25µm) spar, possibly 10% gypsum xtal moulds and interxyn porosity. CL-30% bright orange luminescent clasts. Rock Name: sl brecciated f xyn sparite.

BASE OF UNIT 0.30 TOP OF UNIT 0.70 THICKNESS 0.40

UNIT A3. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact abrupt, planar, sl wavy. Bedding Character 2 mm to 1 cm planar lams. Composition ls w/ 100µm xtal size. Sedimentary Structures minor high-amplitude stylolites. Misc well indurated. A3 Sample/Slab/Peel Description fresh surface colour; wk lt olive-brown (2.5Y 6/2), sedimentary structures; minor stylolites w/ amplitudes to 2 mm, misc; 1 vertical fracture filled w/ f-m xyn spar, xtal size increases toward center of vein, composition; 20% microspar, 75% f xyn spar (mode 20µm), 5% interxyn porosity. Rock Name: microsparitic f xyn sparite.

BASE OF UNIT 0.70 TOP OF UNIT 0.80 THICKNESS 0.10

UNIT A4. Weathering Character prom. Colour WS chalky grey. FS m brownish grey. Basal Contact abrupt, wavy. Bedding Character wavy. Bed/Lam Thickness min 3 cm, max 7 cm, mode 5 cm. Composition ls w/ 100µm xtal size, high porosity and permeability. Sedimentary Structures tr low-amplitude stylolites. A4 Sample/Slab Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; tr low-amplitude stylolites accentuated by brown residual film, composition; 2% carb specks, 5% interxyn sample porosity, 45% spar, 50% microspar. Rock Name: sparry (f xyn) microsparite.

BASE OF UNIT 0.80 TOP OF UNIT 1.10 THICKNESS 0.30

UNIT A5. Weathering Character prom. Colour WS and FS vlt grey. Basal Contact abrupt, irregular. Bedding Character planar lam (1 mm thick) to sl wavy, locally brecciated in lower 10 cm. Bed/Lam Thickness min 1 mm, max 4 cm, mode 2 cm. Composition ls w/ 0.3 mm xtal size, very porous and permeable.

BASE OF UNIT 1.10 TOP OF UNIT 1.60 THICKNESS 0.50

UNIT A6. Weathering Character prom. Colour WS and FS m grey. Basal Contact abrupt planar. Bedding Character sl wavy. Bed/Lam Thickness min 2 cm, max 5 cm, mode 3.5 cm. Composition microspar, low porosity and permeability. A6 Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), composition; 2% dolomite xtals to 100 μ m, some concentrated along fractures (5% fracture porosity), 93% microspar. CL; non-luminescent except for 5% orange complex multi-zoned luminescent spar between clasts and in fractures. Rock Name: microsparite crackle breccia. Misc extensively fractured.

BASE OF UNIT 1.60 TOP OF UNIT 1.85 THICKNESS 0.25

UNIT A7. Weathering Character semi-rec. Colour WS white to buff, FS lt brownish grey. Basal Contact abrupt, planar. Bedding Character sl wavy, locally brecciated. Bed/Lam Thickness min 2 cm, max 10 cm, mode NA. Composition ls, minor carb partings, gn/xtal size <0.1 mm, low porosity and permeability. A7 Sample/Slab Description fresh surface colour; wk m olive-brown (10YR 5/2), misc; sl brecciated, composition; 5% porosity, 95% f xyn spar. Rock Name: f xyn sparite crackle breccia

BASE OF UNIT 1.85 TOP OF UNIT 2.10 THICKNESS 0.25

UNIT A8. Weathering Character prom, overhanging cliff. Colour WS chalky white to vlt grey, minor buff mottles. FS lt brownish grey. Basal Contact abrupt and very wavy. Bedding Character planar. Bed/Lam Thickness min 3 cm, max 5 cm. Composition ls w/ occasional clast moulds to 1.5 cm long. A8 Sample Description (contains large clast moulds). fresh surface colour; lt olive-brown (10YR 6/3), composition; 95% microspar, 5% porosity. Rock Name: microsparite crackle breccia.

BASE OF UNIT 2.10 TOP OF UNIT 4.85 THICKNESS 2.75

UNIT A9. Weathering Character prom. Colour WS and FS brownish m grey. Basal Contact abrupt, very sl wavy. Bedding Character massive. Composition dolomitic ls, gn/xtal size 0.1-0.2 mm. Sedimentary Structures vertical slickensides. A9 Sample/Slab/Thin Section Description fresh surface colour; overall wk olive brown (10YR 5/2), sedimentary structures; dolomitic patches and stylolites, composition; 40% fossils, consisting of 1% disarticulated brach frags, 29% ossicles, 5% tabular stromatoporoids, 5% favositid corals w/ some corallite walls replaced by dolomite, 1 ostracod frag filled w/ clear spar. 35% microspar, 1% bitumen fills pores, 14% dolomite, mostly m xyn, patches contain white 1 mm-sized dolomite xtals. There are microsparite ghosts in the dolomite xtals (calcified dolomite?). Sample porosity is 10% w/ porosity and permeability higher in the dolomitic patchy areas. CL; non-luminescent. Rock Name: c calcarenite: mottled dolomitic (m-c xyn) ossicle-rich biomicrosparite.

BASE OF UNIT 4.85 TOP OF UNIT 7.85 THICKNESS 3.00

UNIT A10. Weathering Character rec covered interval, tr ostracods along stream.

BASE OF UNIT 7.85 TOP OF UNIT 14.60 THICKNESS 6.75

UNIT A11. Section Aa, east side of stream. Weathering Character prom. Colour WS yellowish-brown w/ dk grey lams. FS lt grey w/ m to dk grey lams. Basal Contact covered. Bedding Character wavy to convex-up, thinly lam, 1 mm thick lam, locally brecciated. A 3 cm thick breccia vein extends along bedding. Composition unit is in part a brecciated dolostone, low porosity, clasts are lam dolostone, gn/xtal size <0.1mm, matrix is m grey lam calc dolostone w/ mottled to yellowish-white surface colouration. Sedimentary Structures hummocky to convex-up structures 15 cm high and 8 cm wide, minor high-amplitude stylolites. Misc very well indurated, high density, gives off bitumenous odour when broken. A11a Sample/Slab/Thin Section Description (taken of lower lam dolostone), fresh surface

colour; wk lt olive brown (10YR 6/2) and wk m olive-brown (10YR 5/2), sedimentary structures; low-angle cross-lam, minor low-amplitude stylolites, composition; detrital carbonate, dolomite xtals were originally clastic gns, tr fractures filled w/ 1% calcite, 84% f xyn dolomite in 1-2 mm thick undulatory lams, defined by change of xtal size, 15% interxyn sample porosity. CL; 2% scattered bright luminescent spar. Rock Name: m-c dololite (detrital). A11b Sample/Slab Description (of breccia, matrix consists of lam calc dolostone), fresh surface colour; vw k m olive-brown (10YR 5/1) sedimentary structures; sparite breccia w/ pervasive high-amplitude stylolites w/ considerable black residue, some stylolites fractured, composition; 95% spar, 5% porosity. Rock Name: f xyn sparite mosaic breccia. A11c Sample/Slab Description (vuggy ls from talus), fresh surface colour; dk grey clasts (10YR 4/0) and st xlt yellowish-orange (10YR 8/4) calcite cement, 50% breccia clasts, 25% c xyn spar, misc; calcite cement growing into voids away from clast boundaries, composition; 15% spar, 5% m xyn dolostone, center of one ls clast has been dolomitized (remnant ls rim), 20% porosity (10% vugs; 10% between xtals), 60% microsparite breccia clasts (larger than 2 mm), size range 2 mm to 42 mm, mode 10 mm. CL; non-luminescent. Rock Name: sparry 'matrix' microsparite 'clast' mosaic breccia.

BASE OF UNIT 14.60 TOP OF UNIT 17.35 THICKNESS 2.75

UNIT A12. Weathering Character prom. Colour WS and FS mottled buff and m grey. Basal Contact trans. Bedding Character wavy, irregular, locally brecciated. Bed Thickness min 4 cm, max 21 cm, mode 10 cm. Composition dolostone, locally brecciated, gn/xtal size 0.1-0.2 mm. Fossils small colonial corals, some overturned, small rynchonellid brachs, numerous on some bedding surfaces, possible poorly preserved ostracods. A12 Sample/Slab/Thin Section Description dolostone, fresh surface colour; wk lt brownish-olive (10YR 6/2), sedimentary structures; minor low-amplitude stylolites, composition; 2% favositid coral frags to 20 mm, some corallites filled w/ calcite and tr chert, 10% patches of c xyn spar, some areas of poikilotopic spar cements dolomite xtals in ostracods, tr bitumen fills interxyn pores, 2% chert, 71% f xyn dolomite, dolomite in ostracod shells is larger (150 μ m), 15% sample porosity. CL; tr orange luminescence. FLUOR; multifold zonation of spar, tr fluorescence along stylolites. Rock Name: sparry f xyn dolostone.

Breccia (Pipe?) Description of Unit A12a. Weathering Character prom to semi-rec. Colour WS white, m dk grey. FS white, lt to m grey, cross cuts unit A12. Composition 1. Clasts-mostly ls up to 0.25 m and 2. Matrix-white, calc, gn/xtal size 0.1 to 0.2 mm. Breccia description 22 m upstream from A12 fossil locality.

A12a Breccia Description: Colour WS extensive rusty colouration w/ minor 2 mm wide white veinlets throughout, clasts massive, m brownish grey dolostone, 0.1 to 0.2 mm gn/xtal size. 'Matrix' has dk 1 cm thick m dk grey trans rim (weathering feature?)-numerous brachs. in breccia clasts. Note that this breccia matrix has a coarser gn/xtal size than the last breccia described (A12a) which was more calc. Average clast size 5 cm. Fossils brachs in breccia clasts.

BASE OF UNIT 17.35 TOP OF UNIT 21.35 THICKNESS 4.00

UNIT A13. Weathering Character prom to semi-rec. Colour WS m brownish grey. FS buff alternating w/ lt to m brownish grey. Basal Contact abrupt planar. Bedding Character planar and sl wavy, lams 3 mm thick but thickness changes laterally, alternating buff to m brownish grey. Bed/Lam Thickness min 15 cm, max 30 cm, mode 25 cm. Composition calc dolostone, locally brecciated, gn/xtal size <0.1 mm, tr calcite-filled vugs, tr white calcite lines joints and fracture surfaces about 0.1 mm wide. Sedimentary Structures high-amplitude stylolites. Misc very well indurated (not well fractured). A13 Sample/Slab Description (taken at base, note lams), f xyn dolostone, fresh surface colour; wk lt olive-brown (10YR 6/2) and wk dk olive-brown (10YR 4/2), sedimentary structures; low amplitude stylolites, wavy lams (1-2 mm thick), misc; small high angle reverse fault w/ 2 mm apparent offset, lined w/ m-c xyn dolomite, tr bitumen, 85% f xyn dolomite (40 μ m mode), 15% sample porosity. CL; minor orange luminescent spar veinlets. Rock Name: f xyn dolostone.

Description of laterally equivalent breccia. Cross-cutting subvertical breccia pipe, min 1 m wide crosses A12/13 contact and extends down into covered interval at base of cliff. Pipe branches along bedding plane and separates bedding by at least a metre. Minor 1 mm wide calc veinlets throughout breccia. Clasts made up largely of unit A13. Clasts min 5 mm, max 10 cm, mode 1 to 2 cm. A few clasts are tilted at right angles to bedding, most are rd. Minor vugs (clast moulds). Note: Breccia at this site contains more locally derived clasts but upstream more foreign rock is encountered. Breccia clasts increase in size upstream (A11/12 breccia). Subvertical microfaults occur in unit A13. Fossils numerous ostracods and minor brachs in talus in this area.

BASE OF UNIT 21.35 TOP OF UNIT 22.15 THICKNESS 0.80

UNIT A14. The base of Aa14 is correlative w/ the base of Ab25. Weathering Character semi-prom. Colour WS m yellowish brown, dull metallic blue stain on ostracods (phosphatic?). FS lt brownish w/ small white sparry patches. Basal Contact trans over 0.2 m. Bedding Character irregular planar, beds more massive at base, locally brecciated, mottle texture 5 cm below ostracod horizon. Bed/Lam Thickness min 4 cm, max 20 cm, mode 15 cm. Middle of unit is thinner bedded (min 4 cm, max 15 cm, mode 7 cm). Composition dolostone, mottled, gn size 0.2 mm, composition of middle of unit same, possible dead oil stain, thin lams, bitumenous odour. Sedimentary Structures occasional 1 cm long vugs, lined w/ 0.5 mm euhedral spar. Slickensides at unit top trend 35°, dip 86°. Fossils ostracod-rich bedding planes 2.2 m abu. In middle of unit ostracods in place, all the same type w/ punctate shells, well preserved, long axes trend 65°. Misc well indurated. A14 Sample/Slab/Thin Section Description calc dolostone, fresh surface colour; overall wk m olive-brown (10YR 5/2), composition; 11% ostracod ghosts, one 5 mm-sized biconvex ostracod, shell microstructure is vf xyn, 10% vc xyn spar and tr pyrite fills ostracod, misc; spar veinlets, 79% f-m xyn (mode 50 μ m) dolomite, 10% interxyn sample porosity. CL; non-luminescent except for 3% bright orange luminescent calcite overgrowths. FLUOR; dolomite in veinlets and vugs shows multi-fold zonation. Rock Name: sparry ostracodal f-m xyn dolostone.

BASE OF UNIT 22.15 TOP OF UNIT 25.90 THICKNESS 3.75

UNIT A15. Weathering Character semi-prom. Colour WS yellowish-brown to dk grey. FS lt brown w/ lt calc patches. Basal Contact trans over 5 cm, mostly planar, sl wavy. Bedding Character planar to sl wavy (1 cm amplitude by 5 cm wavelength), locally brecciated. Bed/Lam Thickness in the middle of the unit convex-up structures occur that are 20 cm long by 5 cm high. Composition dolostone, vugs 10 cm long elongate subparallel to bedding, lined w/ 1 cm-sized euhedral spar. Bedding deflects above and below vug, calcite lines joint surfaces. Sedimentary Structures hummocky structures are 30 cm above the wavy lams. Misc a local breccia occurs upstream in this unit. A15 Sample/Slab/Thin Section Description (taken from middle of the unit), fresh surface colour; interlam wk lt olive-brown (10YR 6/2) and wk m olive-brown (10YR 5/2), sedimentary structures; mm-cm thick stylo-lam, misc; 1% organic matter, composition; 94% f xyn anhedral dolomite xtals, 5% interxyn sample porosity, misc; tr vertical calcite veinlets of variable xtal size. CL; non-luminescent except for tr veinlets. FLUOR; irregular and patchy. Rock Name: f xyn dolostone.

BASE OF UNIT 25.90 TOP OF UNIT 27.15 THICKNESS 1.25

UNIT A16. Weathering Character semi-rec. Colour WS chalky cream, alternating w/ dk grey. FS lt to m grey. Basal Contact planar w/ minor convex-up columnar structures. Bedding Character convex-up structures, locally brecciated. Bed/Lam Thickness min 1 cm, max 4 cm, mode 2.5-3.0 cm, lam thicknesses do not change appreciably laterally (1-2 mm thick). Composition calc dolostone w/ 0.1 mm gn size, thin dk carb lams, possible argil content. Sedimentary Structures convex-up club-like structures (up to 7 cm wide and 15 cm high), irregular (5 cm wide, 2 cm amplitude), convex-up structures grade laterally to breccia. Convex-up structures are lam and follow contour of column. Lenticular vugs occur in the central basal portion of each convex-up structure, lined w/ spar, laminae between columns are draped and locally brecciated. A16 Sample/Slab/Thin Section Description (convex-up structures at top of unit) fresh surface colour; interlam wk vlt olive-brown (10YR 7/2) and

wk m olive-brown (10YR 5/2), sedimentary structures; irregular wavy dolostone, sl brecciated, stylolitic, composition; c xyn spar w/ curved xtal boundaries fills & lines large vugs, 3% spar, 92% f-m xyn dolomite & minor calcified dolomite, 5% vugs between clasts to 2 cm in size. CL; spar w/ bright orange luminescent overgrowths line vugs, dolomite is bright red luminescent. FLUOR; very com zoned spar fills vugs. Rock Name: sl sparry f-m xyn dolostone crackle breccia.

BASE OF UNIT 27.15 TOP OF UNIT 27.30 THICKNESS 0.15

UNIT A17. Weathering Character semi-prom. Colour WS lt to m grey overall w/ yellowish-brown mottles, some of which are elongate subparallel to bedding. Yellowish-brown stain lines joints, bedding planes and vugs. FS lt grey w/ m dk grey lams. Basal Contact 7 by 1 cm hummocky to convex-up structures. Bedding Character sl wavy w/ localized convex-up structures, locally brecciated. Convex-up structure 60 cm abu is 7 cm wide, minor breccia around its base. Bed/Lam Thickness min 1 cm, max 10 cm, mode 4 cm. Composition dominantly dolostone w/ minor calcite filling vugs and veinlets, gn/xtal size 0.1 to 0.2 mm. Vugs occur at base of hummocky and convex-up structures. These have a planar base, a convex-up upper surface and are lined w/ spar. A17 Sample/Slab Description (taken near the middle of the unit), fresh surface colour; wk m olive-brown (10YR 5/2) and vwk dk olive-brown (10YR 4/1), sedimentary structures; deformation, composition; 1% spar lines fractures, 2% carb lams, 92% m xyn dolomite, 5% porosity. Rock Name: f-m xyn dolostone crackle breccia.

BASE OF UNIT 27.30 TOP OF UNIT 28.30 THICKNESS 1.00

UNIT A18. (similar to unit A16), Weathering Character semi-rec. Basal Contact sl wavy, mainly planar. Bedding Character mosaic breccia. Composition dolostone breccia. A18 Sample/Slab Description f xyn dolostone mosaic breccia, fresh surface colour; wk vlt yellowish-orange (10YR 7/2) and wk m olive-brown (10YR 5/2), sedimentary structures; hummocky and convex-up structures, deformed and brecciated, composition; 3% m xyn spar fills pore-space between breccia clasts, 5% interxyn porosity, some dolostone clasts are porous and permeable, 32% f xyn dolomite 'matrix', 60% f xyn dolostone breccia clasts ranging from 2 to 50 mm, max size 50 mm, modal size 30 mm. Rock Name: f xyn dolostone 'clast' and 'matrix' mosaic breccia.

BASE OF UNIT 28.30 TOP OF UNIT 28.40 THICKNESS 0.10

UNIT A19. Weathering Character semi-rec. Colour WS lt yellowish buff, alternating w/ brown. FS lt grey alternating w/ m grey. Basal Contact irregular hummocky. Bedding Character planar, locally brecciated. Bed/Lam Thickness min 0.5 cm, max 4 cm, mode 1 cm. Base of A19 has 5 mm thick lams, middle and upper parts have thinner 1 mm thick lams. Composition dolostone, fairly permeable, gn/xtal size 0.1 mm. Sedimentary Structures hummocky structures occur in lower lams. A19 Sample/Slab/Thin Section Description (taken from middle of unit), sl calc f xyn dolostone, in part breccia, fresh surface colour; mottled lt olive brown (10YR 6/3) and wk m olive-brown (10YR 5/2), sedimentary structures; vugs to 5 cm in size lined or filled w/ c to vc spar, 1% isolated spheroidal ooids (0.4 mm diameter), thin dk brown carb films define lam, misc; brecciation and deformation, composition; 2% c xyn spar in fractures and vugs, 88% m xyn dolomite, calcified dolomite com, irregular xtal boundaries, 5% interxyn sample porosity and 5% vugs. CL; spar w/ bright orange-luminescent overgrowths on non-luminescent cores, dolomite is non-luminescent. FLUOR; white fluorescent and zoned dolomite fills vugs, fractures fluoresce white. Rock Name: m xyn dolostone.

BASE OF UNIT 28.40 TOP OF UNIT 28.80 THICKNESS 0.40

UNIT A20. Weathering Character semi-prom, 100% exposure on either side of stream cut valley. Colour WS white m grey w/ buff mottling. FS lt brownish, dk grey thin lams. Basal Contact abrupt, planar to sl wavy. Bedding Character planar irregular, dominantly planar. Bed/Lam Thickness min 1 m, max 2 m, mode 1.5 m. Composition dolostone w/ minor calcite veins, 2 cm-sized vugs lined w/ spar. Sedimentary Structures mottles. Fossils very small

favositid corals and a few gastropods scattered in the basal beds. A20a Sample/Slab/Thin Section Description (taken from the base of the unit), calc dolostone, 10% ossicles, fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, spar veinlets, composition; 5% porosity, 80% m xyn dolomite, tr ostracods, 15% spar, echinoderm ossicles are composed of intergrown dolospar. CL; dull orange-red luminescent dolomite. Rock Name: mottled sparry echinodermal m xyn dolostone. BASE OF UNIT 28.80 TOP OF UNIT 34.55 THICKNESS 5.75

Top of unit A20 is the contact between member B of the Baillarge Formation and the lower member of the Cape Crauford Formation.

UNIT A21. Weathering Character semi-prom to prom. Colour WS m brown. FS lt to m brown. Basal Contact abrupt, planar. Bedding Character planar irregular. Bed/Lam. Thickness as for unit A20, unlam. Composition calc dolostone, high porosity and permeability, 0.1-0.2 mm gn/xtal size. Fossils 3 m abu there is a 0.5 m fossiliferous exposure containing colonial corals and very abundant poorly preserved strophomenid brachs (30%) to 2 cm in size, some broken valves, one orthoconic cephalopod 6 cm long by 1 cm wide, some fossils may be silicified. A21 Sample Description (many samples collected), 40% smooth to f plicate moderately preserved strophic biconvex brachs to 20 mm long, straight hinge line, 1 mm thick shell, most are disarticulated pedicle valves, all the same type of brach valves (dolomitic), 50% dolomite w/ 0.05 mm modal xtal size, 10% porosity. Rock Name: brachiopodal f xyn dolostone.

BASE OF UNIT 34.55 TOP OF UNIT 42.55 THICKNESS 8.00

UNIT A22. Weathering Character rec covered interval.

BASE OF UNIT 42.55 TOP OF UNIT 45.55 THICKNESS 3.00

UNIT A23. Weathering Character prom ledge-former. Colour WS buff. FS m brown w/ dk grey patches, jagged differential weathering on surface is due to pervasive high-amplitude stylolitization. Basal Contact covered. Bedding Character planar irregular. Bed/Lam Thickness very thickly bedded (2.5 m). Composition dolostone w/ low porosity, gn/xtal size 0.2 mm. Chert nodules (rarely white) are scattered and isolated. Umbrella-shaped vugs (planar bottom, convex-up top) 13 cm long, 2 cm high. Sedimentary Structures chert nodules, high-amplitude stylolites and vugs. A23 Sample/Slab/Thin Section Description (taken from the base of the unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; high-amplitude stylolites, vugs to 2 cm lined w/ white 1.5 mm dolospar, filled w/ 1 mm-sized spar, altered dolomitic mottles, microfractures filled w/ clear dolospar, tr silicification, composition; tr ossicles, 5% porosity, 3% spar cement between dolomite rhombs, spar is in part poikilotopic, 1% dk brown μ m-sized inclusions, 92% dolomite is highly variable in size, xtals have cloudy cores, in part poikilotopic (large xtals contain smaller dolomite rhombs), clear dolomite overgrowths on original cloudy inclusion-rich rhombs. CL; rare bright orange luminescent calcite between non-luminescent dolomite xtals. FLUOR; vaguely zoned dolomite. Rock Name: sl sparry m xyn dolostone.

BASE OF UNIT 45.55 TOP OF UNIT 48.05 THICKNESS 2.50

UNIT A24. Weathering Character semi-prom. Colour WS lt brown w/ m to dk yellowish brown patches. FS m grey. Basal Contact abrupt, planar. Bedding Character wavy, irregular. Bed Thickness min 1 cm, max 5 cm, mode 2-3 cm. Composition ls, gn/xtal size 0.2 mm. Sedimentary Structures preferred orientation of orthocone long axes in bedding plane. Fossils orthocones (40 mm long, 5 mm in diameter), numerous on bedding plane, two preferred orientations at 120 and 180°, tr high-spined gastropod 3 cm long. Sample A24(conodonts) taken. A24 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), composition; 25% ostracods, most articulated, valves mainly dissolved, minor gastropods and 2 small orthocones, 10% microspar and 20% m xyn spar, 40% f to m xyn dolomite, some rhombs in microspar-rich areas have microspar ghosts, therefore dolomite formed after the microspar. However, there is also some corrosion and replacement

of dolomite rhombs by microspar, 5% interxyn sample porosity. One articulated ostracod is lined w/ dolospar and filled w/ spar. CL; very dull orange-red luminescent dolomite and non-luminescent calcite. There are rare small-vugs filled w/ orange luminescent dull multiple zoned spar. Rock Name: calc ostracodal f-to-m xyn dolostone. A24a Sample/Slab Description (contains orthocones), fresh surface colour; overall vwk m olive-brown (10YR 5/1), sedimentary structures; low angle cross-lam, composition; center of orthocones is f xyn spar, wall is dolomite. Some orthocone centers, however are m xyn dolomite. 30% small orthocones, septa visible in one specimen, shell is 200 μ m thick and consists of m xyn white dolomite. 40% microspar and spar, misc; scattered dolomite rhombs in microspar. Pore-filling dolomite is white. Dolomite occurs as scattered m xyn rhombs (25%), 100-300 μ m in size, ranging to 600 μ m in places as scattered dolomite rhombs in microspar, misc; where orthocones are replaced by dolomite microspar fills the orthocone, where there is no relic of a shell there is c xyn dolomite, 5% interxyn porosity. Rock Name: dolomitic (m xyn) ostracodal biomicrosparite.

BASE OF UNIT 48.05 TOP OF UNIT 48.45 THICKNESS 0.40

Section Ab, the base of Ab25 is correlative with the base of Aa14. Section Ab starts at lat. 73°16'56"N, long. 88°34'24"W and ends at lat. 73°17'1"N, long. 88°34'30"W. The start of section Ab is about 300 m north of the end of section Aa. Measured thicknesses are reset to 0 at the base of A25.

UNIT A25. Weathering Character semi-prom. Colour WS mottled lt yellowish brown, m brownish grey. FS m grey, sl brownish. Basal Contact obscured by stream. Bedding Character planar irregular. Bed/Lam Thickness min 2 cm, max 10 cm, mode 5 cm. Composition dolostone, gn/xtal size 0.2-0.3 mm mode, vugs to 3 cm, shaped like brach valve moulds, infilled w/ 5 mm dolomite xtals. Sedimentary Structures low-amplitude stylolites. Fossils strophomenid brachs com, disarticulated, poorly preserved, cup corals overturned w/ long axes oriented NS. A25 Sample/Slab/Thin Section Description (taken from top of unit), fresh surface colour; wk m olive-brown (10YR 5/2) and vwk dk olive-brown (10YR 4/1), sedimentary structures; low-amplitude stylolites are accentuated by thin brown carb films, composition; 10% brachs, thin disarticulated and articulated valves 300 μ m thick are replaced by white dolomite, brachs to 20 mm in size. 80% f xyn dolomite rhombs w/ irregular interlocking contacts, 10% interxyn sample porosity, irregular patchy, porous and permeable areas to 20 mm in size. CL; non-luminescent. Rock Name: mottled brachiopodal f xyn dolostone.

BASE OF UNIT 0.00 TOP OF UNIT 2.25 THICKNESS 2.25

UNIT A26. Weathering Character semi-prom. Colour WS and FS interlam lt brownish grey w/ m grey (lams avg a thickness of 2 mm but range to 5 mm). Basal Contact planar, very sl wavy, trans over 10 cm. Bedding Character planar. Bed/Lam Thickness min 2 mm, max 10 cm, mode 5 cm. Composition dolostone, gn/xtal size 0.2 to 0.3 mm, originally may have been a calcarenite, occasional vugs, long axes parallel to bedding, spar lines brach moulds. Fossils poorly preserved brachs. A26 Sample/Slab/Thin Section Description (taken from the middle of the unit), fresh surface colour; wk lt olive-brown (10YR 6/2) and wk m olive-brown (10YR 5/2), composition; 1 echinoderm stem 1 cm long and one ossicle, 2 one cm wide 75 μ m thick dolomitic disarticulated brach valves, 3% spar in vugs below the brachs and other pore space, 1% bitumen and clay(?) fills pores, 86% f-to-m xyn dolomite xtals have an anhedral interlocking texture, 10% interxyn porosity. CL; 1% bright orange-luminescent overgrowths on non-luminescent spar xtal cores in vugs, dolomite is non-luminescent. FLUOR; 1% zoned dolomite fills vugs. Rock Name: sl sparry f to m xyn dolostone.

BASE OF UNIT 2.25 TOP OF UNIT 2.50 THICKNESS 0.25

UNIT A27. Weathering Character semi-rec. Colour WS and FS m grey w/ lt brownish grey lams 1 cm thick. Basal Contact trans over 10 cm, planar, very sl wavy. Bedding Character irregular. Bed/Lam Thickness min 3 cm, max 7 cm, mode 5 cm. Composition dolostone, gn/xtal size 0.2 mm. Sedimentary Structures irregular bedding, low-amplitude stylolites. Fossils

strophomenid brachs, generally convex-up, many disarticulated, poorly preserved. A27
Sample/Slab/Thin Section Description fresh surface colour-interbedded wk lt olive-brown (10YR 6/2) and vw k m olive-brown (10YR 5/1), sedimentary structures; minor low-amplitude stylolites, misc; minor fractures lined w/ white dolospar which is in turn lined w/ spar, 1% stylolitic residue, composition; 85% brachs (dolomitic) to 15 mm, thin shelled, biconvex, both articulated and disarticulated, 1% spar lines dolomite-lined fractures, 4% dolomite is m xyn and has irregular contacts, 10% interxyn porosity. CL; a clotted very dull red luminescence. Rock Name: mottled brachiopodal f to m xyn dolostone.
BASE OF UNIT 2.50 TOP OF UNIT 2.80 THICKNESS 0.30

UNIT A28. Weathering Character semi-prom. Colour WS and FS brownish grey w/ white specks. Basal Contact sl wavy, 1 cm amplitude. Bedding Character wavy. Bed/Lam Thickness min 2 cm, max 17 cm, mode 8 cm. Composition dolostone, tr calc, gn/xtal size 0.5 mm. Sedimentary Structures simple low-angle cross-stratification, low-amplitude stylolites. A28
Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2) w/ vw k xlt yellowish-orange (10YR 8/1) patches, sedimentary structures; minor low-amplitude wispy stylolites, misc; 1 mm wide veinlets filled w/ spar, composition; 30% ostracods consist of dolospar, are 5 mm in size, shell microstructure is replaced by dolomite, some ghosts of valves remain, 5% c xyn spar fills space between dolomite rhombs, bitumen blobs 8 mm long are fractured and filled w/ spar veins, misc; tr pyrite, 60% m xyn dolomite, irregular sutured and planar contacts, 5% interxyn porosity. CL; both luminescent and non-luminescent varieties of calcite and dolomite. Rock Name: sl sparry ostracodal m xyn dolostone.
BASE OF UNIT 2.80 TOP OF UNIT 3.55 THICKNESS 0.75

UNIT A29. Weathering Character semi-prom. Colour WS yellowish brown. FS m brownish grey 2 mm thick lams interstratified w/ dk grey 0.5 mm thick lams. Basal Contact wavy (10 cm wavelength, 1 cm amplitude). Bedding Character wavy in three dimensions (5 cm wavelength, 8 mm amplitude). Bed/Lam Thickness min 1 cm, max 2 cm, lams follow wavy bedding (see FS desc). Composition dominantly dolostone breccia w/ minor calcitic 'matrix', 'clasts' of lam rock, gn/xtal size 0.2 mm. Sedimentary Structures hummocky bedding. A29
Sample/Slab Description fresh surface colour; wk m olive-brown (10YR 5/2) vw k dk olive-brown (10YR 4/1), composition; 2% bitumen fills fractures, microfaults, 93% f xyn dolomite, 50µm modal xtal size, 5% interxyn porosity. Rock Name: f xyn dolostone, locally brecciated sparry ('matrix') dolostone.
BASE OF UNIT 3.55 TOP OF UNIT 3.60 THICKNESS 0.05

UNIT A30. Weathering Character prom. Colour WS and FS buff w/ lt yellowish brown patches, covered w/ black lichen. Basal Contact planar irregular. Bedding Character planar irregular to mottled. Bed/Lam Thickness min 3 cm, max 10 cm, mode 5 cm, unlam. Composition dolostone w/ minor calc patches, gn/xtal size avg 0.3 to 0.5 mm, minor subvertical calcite veinlets. Sedimentary Structures low-amplitude stylolites. Misc fault, fault plane strikes 120°, dips subvertically. Black lichen covers calcite veinlets and calcite lines joint surfaces. A30 Sample/Slab/Thin Section Description (taken from lower part of unit), fresh surface colour; wk lt olive brown (10YR 6/2) and vw k dk olive-brown (10YR 4/1), sedimentary structures; wispy laterally discontinuous stylolites are accentuated by dk brown residual film, composition; 5% ossicles, 3% m to c xyn spar, 1% bitumen, 86% m xyn dolomite w/ irregularly sutured contacts, in places small euhedral dolomite rhombs occur within larger dolomite xtals, 5% interxyn porosity. CL; 1% vug-filling spar has bright orange-luminescent overgrowths on non-luminescent cores. Dolomite luminesces a uniform very dull orange-red. Rock Name: ossicle-bearing m xyn dolostone, locally brecciated.
BASE OF UNIT 3.60 TOP OF UNIT 5.85 THICKNESS 2.25

UNIT A31. Weathering Character semi-prom. Colour WS very sl brownish m grey. FS very sl brownish lt to m grey. Basal Contact trans. Bedding Character wavy irregular, trans to lam in upper 0.5 m. Bed/Lam Thickness min 8 cm, max 30 cm, mode 15 cm. Composition calc dolostone, sl permeable, gn/xtal size 0.2 mm, minor brecciation, 0.2 mm white spar forms

breccia 'matrix', A31 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; mottled wk m olive-brown (10YR 5/2) and vwk m olive-brown (10YR 5/1), sedimentary structures; wispy stylolites accentuated by dk brown carb films, stylolites truncate some ostracods, composition; 15% 3 mm wide ostracods, mostly articulated, valve walls are 125 μ m thick, microstructure consists of lamellae parallel to valve walls, 20% microspar, 15% spar, 1% bitumen, 1% chert and tr pyrite replaces ostracod valves, misc; many articulated ostracods are lined w/ m xyn spar and filled w/ cloudy white c xyn cement. A few articulated ostracods are filled entirely w/ dolospar, 43% m xyn lt brown dolomite, dolomitic areas are patchy, dolomite occurs as euhedral rhombs and as anhedral intergrown xtals where it occurs in microspar, minor calcified dolomite, 5% interxyn sample porosity. CL; bright orange luminescent thin overgrowths over wk orange luminescent dolomite cores, calcite is non-luminescent. There are also small areas of high intensity yellow-orange luminescence. Rock Name: mottled calc ostracodal m xyn dolostone.

BASE OF UNIT 5.85 TOP OF UNIT 7.95 THICKNESS 2.10

UNIT A32. Weathering Character semi-prom to prom. Colour WS m dk grey. FS m grey. Basal Contact trans, mostly obscure. Bedding Character planar. Bed/Lam Thickness min 0.5 mm, max 10 cm, mode NA, lams sl wavy, parallel to bedding. Composition ls, possibly argil, intraclasts along bedding planes 0.5 m from top. Intraclasts (dimensions 5 mm by 5 cm) pass laterally into undisturbed bedding. Sedimentary Structures high-amplitude stylolites. Fossils sparse 1 cm high-spined poorly preserved gastropods. Misc flaggy parting, bitumenous odour, calcite veinlets cross-cut and follow bedding. A32a Sample/Slab/Thin Section Description fresh surface colour; vwk dk olive-brown (10YR 4/1), sedimentary structures; vague 1 mm amplitude stylolites accentuated by black carb film, moderately fractured, some fractures are lined w/ bitumen, composition; tr articulated ostracod shells, 70% peloids (composed mainly of microspar have a 50 μ m mode, range 25-100 μ m). 20% spar, 5% m xyn dolomite (75 μ m mode confined to only a few lams and along fractures, therefore is post-fracturing), 5% interxyn porosity. CL; non-luminescent except for bright orange-luminescent subvertical hairline veinlets. Rock Name: pelsparite. A32b Sample/Slab Description fresh surface colour; vwk dk olive-brown (10YR 4/1), sedimentary structures; none, composition; 54% intraclasts (flat pebble conglomerate), rd pebbles to 95 mm long but only 5 mm wide, are composed of microspar, 5% fossils consist of 1 high-spined gastropod (23 mm high) and many broken gastropod frags, gastropod shell is 700 μ m thick and consists of m xyn cloudy white dolomite. 10% spar, 1% bitumen, 25% dolomite, modal size is m xyn, occurs preferentially between intraclasts, therefore dolomitization occurred after intraclasts were deposited, voids between intraclasts are lined w/ c xyn cloudy white dolomite and filled w/ spar, 5% porosity between clasts. Rock Name: vc calcirudite; sl fossiliferous dolomitic intrasparite.

BASE OF UNIT 7.95 TOP OF UNIT 11.95 THICKNESS 4.00

The contact between member B of the Baillarge Fm and the lower member of the Cape Crauford Fm occurs between units A32 and A33.

UNIT A33. Weathering Character semi-prom to prom. Colour WS m brownish grey, sl olive green. FS m grey. Basal Contact abrupt planar. Bedding Character massive. Composition biomicrite, 15-20% fossils, occasional rd to sbang intraclasts (4 mm wide by 5 cm long), subparallel to bedding. Fossils large high-spined gastropods to 4 cm and many small gastropods, shells white, probably recrystallized, small favositid corals, orthoconic cephalopods. Sample A33a(conodonts). A33 Sample/Slab/Peel Description (rep litho sample) fresh surface colour; wk dk olive-brown (10YR 4/2), composition; one 40 mm high-spined gastropod, 5% ossicles, 1 cm-sized favositid coral frag. 60% micrite/microspar, 30% f xyn dolomite (50 μ m mode), 5% interxyn porosity. Rock Name: fossil-bearing dolomitic (f xyn) micritic microsparite.

BASE OF UNIT 11.95 TOP OF UNIT 12.75 THICKNESS 0.80

UNIT A34. Weathering Character semi-prom. Colour WS interlam m & dk brownish grey. FS interlam m and dk grey. Basal Contact abrupt, planar irregular. Bedding Character wavy.

Bed/Lam Thickness min 1 cm, max 5 cm, mode 1.5 cm, mm-sized lams change thickness laterally. Composition ls, a few intraclasts. Sedimentary Structures wavy bedding, low-amplitude stylolites. A34 Sample/Slab/Thin Section Description (from top of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-angle cross-lam, minor low-amplitude (100 μ m) stylolites, composition; 55% microspar and 35% spar, 5% m xyn dolomite, 125 μ m, has irregular sutured contacts, 5% interxyn sample porosity. CL; non-luminescent except for bright orange-luminescent subvertical 'hairline' veinlets. Rock Name: c calcilitite (detrital): sl dolomitic sparry microsparite.
BASE OF UNIT 12.75 TOP OF UNIT 13.75 THICKNESS 1.00

UNIT A35. Weathering Character prom to semi-prom. Colour WS m olive grey. FS m grey. Basal Contact abrupt, planar. Bedding Character wavy, irregular. Bed/Lam Thickness min 3 mm, max 5 cm, mode NA. Composition ls w/ 0.2 mm modal gn size, up to 1 mm-sized intraclasts(?). Sedimentary Structures low-amplitude stylolites. Fossils minor poorly preserved solitary corals. A35 Sample/Slab Description fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; minor low amplitude stylolites are accentuated by tr residual brown film, composition; 35% articulated 4 mm long biconvex ostracods (partly dolomitic) are filled w/ microspar. Indeterminate shell frags (15%), in part recrystallized, 45% dolomite, mode 100 μ m, scattered dolomite rhombs, 5% interxyn porosity. CL; dull red luminescent dolomite, calcite is non-luminescent. Rock Name: calc ostracodal m xyn dolostone.
BASE OF UNIT 13.75 TOP OF UNIT 13.95 THICKNESS 0.20

UNIT A36. Weathering Character semi-prom. Colour WS interlam m & dk grey. FS interlam m and dk grey. Basal Contact planar. Bedding Character wavy. Bed/Lam Thickness min 1 cm, max 5 cm, mode 1.5 cm. Composition ls, lams vary in thickness laterally, minor intraclasts, vugs. A36 Sample/Slab Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; planar stylolam, brown residue along stylolites, 77% microspar, 10% spar, 1% bitumen, misc; one vug elongate parallel to lam is lined w/ cloudy white c xyn dolomite and filled w/ c xyn spar. 7% dolomite xtals to 150 μ m are confined to certain lams, 5% interxyn porosity. Rock Name: sl dolomitic/sparry microsparite.
BASE OF UNIT 13.95 TOP OF UNIT 14.15 THICKNESS 0.20

UNIT A37. Weathering Character semi-prom. Colour WS m yellowish brown. FS lt to m grey. Basal Contact abrupt planar. Bedding Character irregular. Bed/Lam Thickness mode 25-30 cm. Composition calc dolostone, gn/xtal size 0.5 mm. Sedimentary Structures m brownish grey, bedded chert nodules 25 cm abu. Second stratified chert nodule zone is 40 cm from base, elongate parallel to bedding, nodule size 7 by 3 cm, 5 by 4 cm, mode 7 cm. Fossils lenticular platy (tabular) corals and possible stromatoporoids, very poorly preserved. A37 Sample/Slab/Thin Section Description fresh surface colour; mottled wk lt olive-brown (10YR 6/2) and wk dk olive-brown (10YR 4/2), composition; 5% favositid coral ghosts and chain(?) corals. One 35 mm long favositid coral frag (3%), tr chain coral frag, 5% ossicles, 5% spar, 10% bitumen, 3% f xyn chert replaces dolomite, misc; brittle bitumen fills interxyn porosity. Dolomite (62%) is m xyn, calc patches of c xyn euhedral dolomite rhombs are surrounded by spar, some c xyn dolomite rhombs enclose smaller dolomite rhombs, 10% interxyn porosity. CL; vwvk orange-red luminescent dolomite. Only the largest xtals have an outer orange luminescent rim. Rock Name: bitumenous/fossiliferous m xyn dolostone.
BASE OF UNIT 14.15 TOP OF UNIT 14.95 THICKNESS 0.80

UNIT A38. Weathering Character prom. Colour WS lt brownish grey. FS lt grey. Basal Contact abrupt planar. Bedding Character wavy (3 cm wavelength, 0.5 cm amplitude). Bed/Lam Thickness min 2 cm, max 7 cm, mode 5 cm, laterally continuous lams. Composition ls w/ 0.2-0.3 mm gn size, parting along bedding planes. A38 Sample/Slab/Thin Section Description fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; cross-lam, minor low-amplitude stylolites, 30% microspar, 10% spar, 55% dolomite (100 μ m-sized xtals) has numerous microspar inclusions, 5% porosity. CL; non-luminescent. Rock Name: c dololite/vf dolarenite: cross-lam sparry/microsparitic m xyn dolostone.

BASE OF UNIT 14.95 TOP OF UNIT 16.45 THICKNESS 1.50

UNIT A39. Weathering Character prom. Colour WS yellowish brown. FS creamy white. Basal Contact abrupt planar. Bedding Character chaotic (brecciated). Bed/Lam Thickness max 30 cm. Composition ls breccia, gn/xtal size 0.2 mm (matrix), breccia clasts 10 cm long, rd, tr scattered novaculite nodules and clasts 2 cm in diameter, up to 15 cm in size, ellipsoidal to spherical, smaller ones are ang to sband. Sedimentary Structures breccia clast moulds to 20 mm in size, gypsum xtal moulds. Misc breccia pipes throughout the unit. A39
Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; massive, misc; sl fractured, brecciated, composition; 2% non-carbonate mat'l, 60% f-m xyn spar, 20% f-m xyn dolomite, size varies w/ spar size, very extensive calcified dolomite, 15% gypsum(?) xtal moulds to 12 mm, 5% interxyn porosity. CL; bright orange luminescent rims on dull orange luminescent calcite (w/ dolomite inclusions). Rock Name: dolomitic f-m xyn sparite 'clast & matrix' breccia. A39a Sample/Slab/Peel Description rubble breccia, buff and grey ang clasts, mode 30 mm, 5% clast mouldic porosity, 20% porosity between clasts. Breccia clast size range is 2 to 50 mm, mode is 10 mm. Breccia clast composition; 20% f-m xyn dolostone clasts, 50% f-m xyn sparite clasts, 30% 'matrix'. Rock Name: variously dolomitic f-m xyn sparite clast rubble breccia. A39b Sample/Slab Description f xyn sparite 'clast & matrix' breccia w/ 20% clast moulds, fresh surface colour; wk xlt yellowish-orange (10YR 8/2), moulds to 8 mm, unfossiliferous. Rock Name: f xyn sparite 'clast' rubble breccia. A39c Sample/Slab/Thin Section Description fresh surface colour; xlt yellowish-orange (10YR 8/3), sedimentary structures; clast moulds to 10 mm, mode 3 mm, massive. 75% f xyn spar, misc; large clast moulds, porosity; 15% clast moulds to 10 mm, mode is 3 mm, 10% interxyn porosity. CL; non-luminescent spar w/ 30% bright orange luminescent overgrowths. Many relict clasts are visible in ordinary light. The 'matrix' is mainly non-luminescent. Rock Name: clast mouldic f xyn sparite 'clast/matrix' breccia.
BASE OF UNIT 16.45 TOP OF UNIT 19.45 THICKNESS 3.00

UNIT A40. Weathering Character semi-prom. Colour WS rusty. FS m grey. Basal Contact convex-up structures (to 0.75 m amplitude) on top of breccia. Bedding Character chaotic breccia at base, more bedded towards top where degree of brecciation decreases. Bed/Lam Thickness approx 30-40 cm near top of the unit, still brecciated however. Composition calc dolostone contains numerous vugs, clasts near the base have a varied litho, only lam clasts of the overlying mat'l occur. Sedimentary Structures low-amplitude stylolites, convex-up structures and vugs. A40 Sample/Slab Description fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; tr stylolites lined w/ bitumen. composition; 65% f-m xyn spar, 5% brown residue, tr pyrite xtals 25 μ m in size, 5% m-c xyn dolomite, 15% vugs to 17 mm, 10% interxyn porosity. Rock Name: sl dolomitic f-m xyn sparite.
BASE OF UNIT 19.45 TOP OF UNIT 22.85 THICKNESS 3.40

UNIT A41. Weathering Character semi-rec. Colour WS buff to yellowish brown. FS m brown to grey. Basal Contact obscured by scree. Bedding Character dominantly planar, locally wavy (30 cm wavelength). Bed/Lam Thickness min 20 cm, max 40 cm, mode 30 cm, alternating 1 mm lt and dk lams. Composition dolostone, 0.3 mm gn/xtal size. A41 Sample/Slab Description fresh surface colour; 8 cm wk lt olive-brown (10YR 6/2) and wk m olive-brown (10YR 5/2), misc; 50 μ m thick f xyn spar veinlets, 15% intraclasts to 15 mm long by 2 mm wide, 5% f xyn spar, 70% dolomite, 10% interxyn porosity. Rock Name: sl sparry intraclastic m xyn dolostone.

BASE OF UNIT 22.85 TOP OF UNIT 25.85 THICKNESS 3.00

UNIT A42. Weathering Character semi-prom. Two interbedded lithologies (70%A, 30%B).

Litho A. Colour WS lt grey. FS m brownish grey. Basal Contact abrupt, planar. Bedding Character planar, laterally continuous. Bed/Lam Thickness min 6 cm, max 20 cm, mode 10 cm. Composition ls. A42a Sample Description 95% f xyn sparite w/ 5% porosity, minor carb films, fresh surface colour; wk dk olive-brown (10YR 4/2).

Litho B. Colour WS lt brownish grey. FS m brownish grey. Bed/Lam Thickness min 1 cm, max 5 cm, mode 3 cm. Composition ls. Sedimentary Structures low-angle cross-lam. Sample A42 (conodonts). A42b Sample/Slab Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low angle cross-lam and mm lam, composition; 90% f xyn spar, 10% porosity. Rock Name: low-angle cross-lam m-c calcilitite. BASE OF UNIT 25.85 TOP OF UNIT 28.35 THICKNESS 2.50

UNIT A43. Weathering Character semi-prom. Colour WS m yellowish brown (rust coloured). FS m grey, trans over 5 cm. Basal Contact abrupt, planar. Bedding Character planar, very sl wavy. Bed/Lam Thickness min 3 cm, max 6 cm, mode 4 cm. Composition ls. Sedimentary Structures wavy lams, convex-up structures and high-amplitude stylolites. A43 Sample/Slab Description (taken from base of unit), fresh surface colour; wk lt olive brown (10YR 6/2) and wk m olive-brown (10YR 5/2), sedimentary structures; high-amplitude stylolites and convex-up structures, misc; tr quartz concentrated along stylolites, composition; 87% f xyn spar, tr chert, 3% m-c xyn dolomite, concentrated along stylolites, 10% porosity. Rock Name: sl dolomitic f xyn sparite. BASE OF UNIT 28.35 TOP OF UNIT 29.15 THICKNESS 0.80

UNIT A44. Weathering Character prom. Colour WS m yellowish-brown. FS lt to m grey. Basal Contact trans. Bedding Character planar, extremely fractured, difficult to distinguish bedding. Bed/Lam Thickness 20 cm. Composition ls w/ 0.2 mm gn/xtal size, novaculite nodule 8 cm by 4 cm, elongate parallel to bedding, also dk grey chert. Sedimentary Structures stylolites form local lens-shaped bodies 40 cm long, 3 cm thick at base of unit. A44 Sample/Slab Description (taken near base of unit), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; massive, composition; 5% shell frags, 90% f xyn spar, 5% interxyn sample porosity. Rock Name: shell frag-bearing f-xyn sparite. BASE OF UNIT 29.15 TOP OF UNIT 34.15 THICKNESS 5.00

UNIT A45. Weathering Character semi-rec. Colour WS whitish grey to buff. FS lt to m grey. Basal Contact abrupt, planar. Bedding Character planar, faintly lam. Bed/Lam Thickness min 1 cm, max 2 cm, mode 1.5 cm. Composition ls, becomes more fractured towards top of unit. Sedimentary Structures locally kink-folded. A45 Sample/Slab Description (taken from top of unit), fresh surface colour; wk dk olive-brown (10YR 4/2), lams separated by thin black carb film, composition; 2% bitumen fills interxyn pores, 5% interxyn porosity, 93% microspar. Rock Name: microsparite. BASE OF UNIT 34.15 TOP OF UNIT 40.65 THICKNESS 6.50

UNIT A46. Weathering Character semi-rec. Colour WS and FS buff to lt grey. Basal Contact trans over 5 cm, planar. Bedding Character dominantly planar, wavy in places. Bed/Lam Thickness min 2 cm, max 17 cm, mode 6 cm. Composition calc dolostone, vf gn/xtal size. A46 Sample/Slab Description fresh surface colour; interlam wk vlt yellowish-orange (10YR 7/2) and vwk m olive-brown (10YR 5/1), sedimentary structures; low-angle cross-lam (1 cm high sets), composition; 67% intraclasts to 5 mm by 0.2 mm in size, consisting of 5% spar and 55% f xyn dolomite, 8% m to c xyn spar, 15% bitumen fills interxyn pores and is segregated into bitumenous-rich and poor lams, tr pyrite, m-c dolarenite, 10% interxyn porosity. Rock Name: bitumenous intrasparite. BASE OF UNIT 40.65 TOP OF UNIT 41.65 THICKNESS 1.00

UNIT A47. Section Ab47 (at 42 m) is correlative w/ the base of Ac48. Weathering Character very prom, cavernous weathering. Colour WS buff. FS lt grey. Basal Contact trans over 10 cm, planar, locally flexured. Bedding Character rubble breccia. Composition breccia (clasts 20 cm to 1 m, generally large clasts are rd, questionable breccia within a breccia in places, small clasts more ang). The 'clasts' are generally all lam is and the 'matrix' is calc as well. Sedimentary Structures vugs. A47 Sample/Slab/Thin section Description fresh surface colour; vwk yellowish-orange (10YR 7/1), sedimentary structures; laterally discontinuous stylolites are accentuated by dk brown residue, 2% quartz replaces

clasts or fills clast moulds. Clasts consist of 53% microspar, 15% microspar 'matrix', 10% f xyn spar, 2% quartz replacing or filling clast moulds, some quartz replaces gypsum(?), 15% clast moulds, generally <1 cm in size, 5% interxyn porosity. Breccia clasts range from 2 to 27 mm in size and have a 5 mm mode. CL; thin bright orange-luminescent calcite overgrowths on very dull orange luminescent spar cores. The overgrowths occur only on those sides adjacent to pore space e.g., calcite lining vugs. Rock Name: sparry microsparite 'clast' microsparite 'matrix' rubble breccia.

BASE OF UNIT 41.65 TOP OF UNIT 49.15 THICKNESS 7.50

UNIT A48. Sub-section Ac. Start Ac at lat. 73°17'16"N, long. 88°34'10"W. Section Ac end lat. 73°17'21"N, long. 88°34'30"W. Section Ac start is 550 m north of the end of section Ab. The base of Ac48 is correlative w/ Ab47 (at 42 m) and Ad63 (at 19m). Cumulative thicknesses are recorded starting at zero at the base of A48.

Weathering Character semi-prom. Colour WS yellow brownish m grey. FS uniform m grey. Basal Contact convex-up (20 cm wide) structures. Bedding Character planar, locally contorted and brecciated. Bed/Lam Thickness min 2 cm, max 5 cm, mode 3 cm. Composition ls w/ 0.2 mm gn/xtal size, local inversely graded breccia is trans upward from crackle to mosaic breccia, est 30% porosity between clasts. Approx 3 cm modal clast size 30 cm abu. Sedimentary Structures 0.8 cm thick lams, m grey unit, alternating w/ 1 mm lt brownish grey lams, vugs 4.5 by 1 cm, elongate parallel to bedding, lined w/ 5 mm-sized spar. Misc flaggy parting. A48 Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; lam, m to c xyn spar, 2% dk brown mat'l, 80% m xyn dolomite cemented by 8% spar, 10% interxyn porosity. Rock Name: c dololomite/vf dolarenite (clastic); sparry f-m xyn dolostone.

BASE OF UNIT 0.00 TOP OF UNIT 1.00 THICKNESS 1.00

UNIT A49. Weathering Character prom, massive cliff former. Colour WS chalky white w/ local m yellowish brown surface stain. FS m lt grey. Basal Contact abrupt, convex-up structures. Bedding Character inversely graded rubble breccia, clasts 1-2 cm, ang to sbang, highly irregularly shaped, unoriented clast long axes. Composition ls breccia, 1 m abu the clast size increases significantly. In the upper part of the unit (top 0.5 m), matrix occurs as for lower part. It differs by containing large ang clasts, min size 20 by 15 cm, up to 2.5 by 0.3 m. All clasts are ang and have the same appearance as those in unit A48. Dip of all imbricated clasts is 15 to 20°N. At least 8 clasts occur in a distance of 50 m along the exposure, all w/ the same imbrication. A few of the clasts have been deformed. Sedimentary Structures high-amplitude stylolites at the base, contorted clasts, coated gns, vugs. A49 Sample/Slab/Thin Section Description (taken near base of unit), fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; breccia, clast boundaries are very poorly defined, mode is 15 mm, tr stylolites, composition; 69% m xyn spar w/ irregular intergrown xtal boundaries, misc; tr quartz pseudomorphs after gypsum(?), 1% carb mat'l, 30% interxyn and clast (gypsum xtal?) mouldic porosity. CL; 3% thin bright orange-luminescent calcite overgrowths on spar. Rock Name: f xyn sparite clast breccia. A49b Sample/Slab/Thin Section Description fresh surface colour; lt olive brown (10YR 6/3), sedimentary structures; coated clasts to 20 mm in size consist of interlam m-to-c xyn spar (40%) and m xyn dolostone (30%), f xyn dolomite w/ extensive calcified dolomite mainly contained in m xyn spar rhombs, minor needle-shaped dolomite xtals have grown outward from spar rhombs (recent growth?), minor chalcedony, 30% interxyn porosity (some very porous lams contain coated clasts). CL; non-luminescent except for overgrowths of orange-luminescent calcite. FLUOR; most of the spar in this sample displays complex multi-fold zonation. Rock Name: coated clast sparitic m xyn dolosparite.

BASE OF UNIT 1.00 TOP OF UNIT 3.00 THICKNESS 2.00

UNIT A50. Weathering Character prom. Colour WS chalky white w/ local m yellowish brown surface staining. FS m-lt grey. Basal Contact abrupt, planar to convex-up. Bedding Character breccia. Composition breccia, 70% framework, 30% matrix. Sedimentary Structures;

low-amplitude stylolites, vugs. A50a Sample/Slab Description (taken from a dolostone clast), fresh surface colour; lt olive brown (10YR 6/3), composition; 5% m xyn spar, 10% interxyn porosity, 85% f-m xyn dolomite. Rock Name: sl sparry f-m xyn dolostone clast. A50b Sample/Slab/Thin Section Description (taken from a dolostone clast), fresh surface colour; mottled overall lt olive brown (10YR 6/3), sedimentary structures; tr wispy stylolites are accentuated by thin carb films, misc; segregated patchy areas of f and m xyn dolospar, original vugs(?) lined w/ white cloudy m xyn dolomite xtals, filled w/ m xyn spar, composition; 5% f-m xyn spar some of which is poikilotopic and contains small dolomite xtals, 3% residue along wispy stylolites, 82% anhedral intergrown m xyn dolomite, minor calcified dolomite as replaced dolomite edges, most is sl brown, 10% sample porosity includes 5% gypsum(?) xtal moulds to 5 mm. CL; a non-luminescent clotted dull texture, 2% bright orange-luminescent overgrowths on calcite. Rock Name: mottled sl sparry (m xyn) m xyn dolostone breccia clast.

BASE OF UNIT 3.00 TOP OF UNIT 18.00 THICKNESS 13.00

UNIT A51. Weathering Character semi-rec. Colour WS lt brownish grey. FS m grey. Basal Contact abrupt planar. Bedding Character planar, but contains a bedding plane step fault, unit is flexed upward, flaggy parting along bedding. Bed/Lam Thickness <1 cm to 2 cm max. Composition ls, gn size <1 mm. A51 Sample/Slab Description (taken from flexured area), fresh surface colour; vw dk olive-brown (10YR 4/1), sedimentary structures and composition; interlam vf and f gn calcarenite, lam thickness 5 mm, misc; bitumen lines 1 mm wide subvertical fractures that are filled w/ m xyn spar, 10% interxyn/intergranular porosity. Rock Name: interlam vf and f calcarenite.

BASE OF UNIT 18.00 TOP OF UNIT 20.00 THICKNESS 2.00

UNIT A52. Weathering Character prom. Colour WS lt grey w/ yellowish brown patches. FS lt to m grey. Basal Contact abrupt, planar. Bedding Character rubble breccia. Composition breccia, clasts are composed of ls, gn/xtal size <1 mm, clasts are the same litho as A51 (35 by 20 cm). Clasts are ang and randomly oriented in breccia, large clasts occur about 2 m abu, inversely graded wrt clast size. However a few rare 25 cm square clasts occur immediately above the A51/52 contact. Large imbricated clasts as in the underlying units were not observed. Sedimentary Structures high-amplitude stylolites and vugs. A52 Sample/Slab/Thin Section Description (taken near base of unit), fresh surface colour; overall wk lt olive-brown (10YR 6/2), sedimentary structures; high-amplitude stylolites accentuated by thin brown film, composition; 78% spar, xtal boundaries irregular and intergrown, m xyn spar lines vugs, 2% opaques, 10% gypsum(?) xtal moulds to 4 mm, 10% interxyn porosity. 60% of breccia clasts are larger than 2 mm, composed of spar, ang to sbrd, clasts-min 2 mm, max-16 mm, mode 5 mm, 'matrix' is sparite. CL; 30% 'clasts' in which spar (non-luminescent) has bright luminescent overgrowths. Rock Name: f-m xyn sparite 'clast & matrix' rubble breccia.

BASE OF UNIT 20.00 TOP OF UNIT 24.50 THICKNESS 4.50

UNIT A53. Sub-section Ad start is 400 m north of the end of section Ac. Section Ad (units 53 to 64) starts at lat. 73° 17' 34" N, long. 88° 34' 18" W and ends at lat. 73° 17' 46" N, long. 88° 34' 33" W. Weathering Character semi-prom to prom, 1 sq m exposure. Colour WS and FS overall m grey w/ dk grey to black wavy streaks in bedding. Basal Contact covered. Bedding Character wavy, irregular, locally brecciated. Bed/Lam Thickness min 3 cm, max 17 cm, mode 8 cm, carb lams irregularly spaced, 1 to 5 mm thick. Composition dolostone w/ 0.1 to 0.2 mm gn/xtal size, lam, carb parting. Misc very well indurated. Thicknesses recorded start at zero at the base of unit A53. A53 Sample/Slab/Thin Section Description fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; lams of variable thickness, composition; 3% carb mat'l ranges to 5% in some lams where stylolites are com and have truncated dolomite rhombs. Most non-carb mat'l is between dolomite xtals, 77% f xyn dolomite, most xtals are anhedral and intergrown, 20% interxyn porosity. CL; one in part dull luminescent spar veinlet, dolomite is non-luminescent. Rock Name: inclusion-rich f xyn dolostone.

BASE OF UNIT 0.00 TOP OF UNIT 0.60 THICKNESS 0.60

UNIT A53a. (local rubble breccia, 5 m-wide pipe). Weathering Character prom. Colour WS m grey w/ irregular yellowish brown streaks and patches. 'Clasts' are m grey. FS (of clast) lt to m grey, 'matrix' lt buff grey. Basal Contact abrupt. Bedding Character rubble breccia. Breccia Thickness 3 m high by 5 m wide. Composition clasts 70-80% dolostone, matrix 20-30% consisting of 0.5 mm-sized mat'l, clast size mode is 0.75 m. Sedimentary Structures subvertical slickensides on fault plane.

BASE OF UNIT 0.0 TOP OF UNIT 3.0 THICKNESS 3.0

UNIT A54. Weathering Character semi-prom to prom, 1 sq m exposure. Colour WS and FS overall lt-m grey. Basal Contact abrupt, sl wavy. Bedding Character unbedded, but crenulated sections 3 to 4 cm long. Composition dolostone, vugs 3 by 5 cm, elongate parallel to unit contacts. Misc extremely well indurated. A54 Sample/Slab Description fresh surface colour; lt olive-brown (10YR 6/3), composition; 35% f-c xyn spar, 40% m xyn dolomite, tr favositid coral, 25% porosity. Rock Name: sparry m xyn dolostone.

BASE OF UNIT 0.60 TOP OF UNIT 1.50 THICKNESS 0.90

UNIT A55. Weathering Character prom. Colour WS m brownish grey, alternating lt and dk bands (1-2 cm). FS lt to m brownish grey w/ white patches. Basal Contact indet due to brecciation, probably abrupt, irregular. Bedding Character planar lam, locally crackle breccia. Bed/Lam Thickness min 10 cm, max 20 cm, lam in upper m is f lam (1 mm), upper lams are laterally continuous and do not vary in thickness. Thicker lams occur in the middle of the unit where they are laterally continuous over 1 m but vary in thickness. Composition dolostone, w/ small sparry patches, gn/xtal size in upper m of unit is 0.2 mm, xtal size is <1mm in middle of unit, locally brecciated. Sedimentary Structures planar lam. A55 Sample/Slab/Thin Section Description fresh surface colour; mottled wk xlt yellowish orange (10YR 8/2) to wk lt olive-brown (10YR 6/2), misc; sl fractured, veins filled w/ spar, composition; one small orthocone frag 3 mm wide by 7 mm long, tr ossicles, 5% microspar/spar fills fractures, 85% m xyn dolomite (100 μ m mode), cloudy white to lt brown, some dolomite rhombs are cemented by spar, 10% sample porosity. CL; very dull luminescent dolomite, calcite is non-luminescent. Rock Name: mottled sparry m xyn dolostone breccia clast (from local crackle breccia).

BASE OF UNIT 1.50 TOP OF UNIT 2.25 THICKNESS 0.75

UNIT A56. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact abrupt, disrupted. Bedding Character planar, irregular, locally brecciated. Bed/Lam Thickness min 10 cm, max 20 cm, mode NA. Composition dolostone, gn/xtal size 0.4 mm. Sedimentary Structures planar bedding, less well developed than unit A55, almost massive in the upper part. A56 Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; vague lam, composition; 5% ossicles, 1% spar, 4% dispersed brown matter, 65% dolomite, 25% porosity. CL; bright orange-luminescent zoned calcite, dolomite is non-luminescent. Rock Name: f-m xyn dolostone.

BASE OF UNIT 2.25 TOP OF UNIT 2.55 THICKNESS 0.30

UNIT A57. Weathering Character prom. Colour WS and FS m yellow brownish grey. Also m and dk grey irregularly spaced beds. Basal Contact abrupt, planar. Bedding Character planar, laterally continuous, locally brecciated, thickness of lams is laterally the same over at least a metre. Wavy lams occur just over the basal contact. Bed/Lam Thickness min 3 cm, max 15 cm, mode 10 cm. Dk lams 30% (1 mm thick), lt lams 70% (3 mm thick). Composition dolostone 0.1 to 0.2 mm xtal size, locally brecciated. Sedimentary Structures minor deformation on upper contact. A57 Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; vague lams, composition; 1% spar, 2% non-carbonate mat'l, 82% dolomite, bimodal 20 μ m and 150 μ m dolomite, some poikilotopic calcite contains 20 μ m euhedral dolomite rhombs, mostly anhedral intergrown xtals, 15% interxyn porosity. CL; non-luminescent except for bright luminescent calcite overgrowths on spar filling vugs. Rock Name: f-m and m xyn dolostone.

BASE OF UNIT 2.55 TOP OF UNIT 3.15 THICKNESS 0.60

UNIT A58. Weathering Character semi-rec, undercuts above unit by about 1 m. Colour WS and FS lt to m brownish grey. Basal Contact covered. Bedding Character planar, laterally continuous, locally brecciated. Bed/Lam Thickness min 3 cm, max 30 cm, mode NA, laterally discontinuous dk lams. Some lenticular lenses 6 cm by 5 mm. Composition dolostone, gn/xtal size 0.2 mm, locally brecciated. Sedimentary Structures tr stylolites, planar lams. Breccia pipes extend from unit A59 down into this unit. Misc A58 contains numerous subvertical micro-faults, exposure is cross-cut by horizontal and vertical breccia pipes 20 cm wide. Subvertical spar veinlets 1 mm wide cross-cut sequence and breccia, clasts 70%, matrix 30%, clasts to 25 cm long by 10 cm wide. A58 Sample/Slab Description (taken from middle of unit), fresh surface colour; interbedded wk lt olive-brown (10YR 6/2) and vw k m olive-brown (10YR 5/1), sedimentary structures; planar lams, misc; lams/beds fractured, composition; detrital(?) carbonate, 4% spar fills vertical fractures and occurs along lams, 81% f xyn dolomite (50µm modal size), 15% interxyn porosity. Rock Name: sl sparry f xyn detrital(?) dolostone crackle breccia.

BASE OF UNIT 3.15 TOP OF UNIT 4.65 THICKNESS 1.50

UNIT A59. Weathering Character prom. Colour WS and FS alternating m and dk beds. Basal Contact abrupt, planar, sl undulatory due to local deformation. Bedding Character planar, irregular, locally brecciated. Bed/Lam Thickness min 1 cm, max 10 cm, mode NA, varies laterally due to stylolitization. Thick beds are generally unlam, thin beds have mm-sized lams. Composition ls, gn size <0.1 mm, locally brecciated. Sedimentary Structures minor high-amplitude stylolites. Misc numerous joints spaced 1 to 10 cm apart, strike 100° w/ vertical dip. A59 Sample/Slab Description (rep litho sample), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; planar lam to low-angle cross-lam, composition; 70% microspar, 25% spar, 5% interxyn porosity. Rock Name: sparry microsparite. Sample A59 (conodonts) taken.

BASE OF UNIT 4.65 TOP OF UNIT 7.95 THICKNESS 3.30

UNIT A60. Weathering Character prom. Colour WS m yellow-brownish grey and m grey, irregular patches of both. FS m brownish grey. Basal Contact abrupt, planar. Bedding Character locally crackle breccia. Bed/Lam Thickness NA. Composition ls, gn/xtal size <0.1 mm, microxyn. Sedimentary Structures high-amplitude stylolites and slickensided breccia clasts com. A60 Sample Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; slickensided breccia clasts, planar lam but folded in places, breccia clasts min size 2 mm, max 40 mm, mode 20 mm, tr 1 mm-sized gypsum(?) xtal moulds, composition; 90% microspar, 5% interclast porosity and 5% interxyn porosity. Rock Name: microsparite 'clast' crackle breccia Sample A60 (conodonts) taken.

BASE OF UNIT 7.95 TOP OF UNIT 14.45 THICKNESS 6.50

UNIT A61. Weathering Character rec covered interval.

BASE OF UNIT 14.45 TOP OF UNIT 18.45 THICKNESS 4.00

UNIT A62. Weathering Character rec (2 sq m exposure), cavernous weathering. Colour WS and FS m brownish grey. Basal Contact covered. Bedding Character planar irregular, locally brecciated. Bed/Lam Thickness min 1 cm, max 3 cm, mode 2 cm, lam. Composition sparry dolostone breccia. Sedimentary Structures lam.

Unit A62a. Weathering Character rec. Colour WS lt to m grey w/ yellowish brown patches. Grey clasts in yellowish brown matrix. FS aa but lighter in colour. Composition calc dolostone breccia, 75% clasts, 25% matrix, ang clasts 1 to 2 cm. Sedimentary Structures high- and low-amplitude stylolites. A62a Sample/Slab Description fresh surface colour; vw k xlt yellowish orange (10YR 8/1) clasts in a wk vlt yellowish orange (10YR 7/2) 'matrix', sedimentary structures; breccia, composition; breccia, 40% spar, 45% f-m xyn dolomite, clasts are very porous f xyn dolosparite, 10% clast-mouldic and fracture porosity and 5% interxyn porosity, breccia clasts are buff and have a high porosity/permeability, min clast size 2 mm, max 25 mm, mode 7 mm. Rock Name: sparry dolostone clast rubble breccia.

BASE OF UNIT 18.45 TOP OF UNIT 18.75 THICKNESS 0.30

UNIT A63. Section Ad63 (at 19 m) is correlative w/ the base of Ac48 and Ab47 (at 42 m). Weathering Character prom. Colour WS m brownish grey w/ irregular yellowish brown patches. FS m brownish grey. Basal Contact abrupt, planar irregular. Bedding Character stratified rubble breccia. Composition breccia, all ls clasts, 0.5 m abu clasts are 3 to 10 cm in size, inversely graded. Clasts become 3 to 4 m and larger, subequant, sbang, randomly oriented, clasts microsparitic. Basal 0.5 m is normally graded, clast size 3 cm at base and grades up to 1 cm-sized clasts. At 1.75 m abu large clasts (1 by 2 m) occur that are elongate parallel to bedding. About 8 m abu there are 4 m long 'clasts' composed of calc dolostone, sbrd, surface extensively leached, 'matrix' contains vugs. Sedimentary Structures high- and low-amplitude stylolites. Fossils 15 m abu ossicles and a solitary coral were observed in a ls clast. A63 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, misc; clasts ang-sbang, composition; 5% pyrite as pore-lining between clasts, occurs between spar and dolospar cement, therefore is the last generation cement. A63 of m calcirudite-sized breccia, 10% f-to-m xyn spar, size increases away from clast boundaries, 5% dolomite occurs between clasts and contains spar, therefore is post spar, 20% interclast and 5% porosity in clasts, 55% breccia clasts (larger than 2 mm) are mainly microsparite/f xyn sparite, breccia clast min size is 2 mm, max size 30 mm, modal size 10 mm. CL; calcite between breccia clasts is bright orange luminescent and zoned, com w/ non-luminescent cores. The breccia clasts themselves are non-luminescent. FLUOR; clasts are variously fluorescent and some spar between clasts is zoned. Rock Name: sl dolomitic/sl pyritic/microsparite/f xyn sparite 'clast' rubble breccia. A63a Sample/Slab/Peel Description (coral), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; high-amplitude stylolites throughout, misc; unoriented sample, composition; 100% solitary upright coral, 25 mm max diameter corallum, 2% ossicles, 1 favositid coral 30 mm in size, corallites 1 mm across, hexagonal in shape, 50% peloids (consisting of microspar) ranging 0.1 to 0.3 mm in size w/ a 0.2 mm size mode, 20% microspar, 30% spar (10% fills corallites), 5% porosity. Rock Name: favositid coral filled w/ pelsparite.

BASE OF UNIT 18.75 TOP OF UNIT 39.25 THICKNESS 20.50

There is an anticline-syncline pair w/ a flat-lying undisturbed unit near the top of the hill.

UNIT A64. Interbedded buff and m brownish grey beds. Weathering Character prom (excellent exposure). A64a are the lt coloured beds, A64b the dk beds. Basal Contact highly irregular.

Unit A64A description. Weathering Character prom. Colour WS buff to lt brownish grey. FS lt brown. Bedding Character planar, locally brecciated. Bed/Lam Thickness min 1 cm, max 10 cm, mode 5 cm, faint lam, total thickness 35 cm. Composition calc dolostone w/ microxyn gn size <0.1 mm, minor local brecciation. Sedimentary Structures high-amplitude stylolites. Misc strong bitumenous odour upon striking. A64A Sample/Slab Description (taken 3 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; planar lam, 4 mm amplitude stylolites, composition; 30% spar, 60% microspar, 10% porosity, misc; extensively fractured w/ 2% fracture porosity. Rock Name: sparry microsparite.

Unit A64B description. Weathering Character prom. Colour WS and FS m brownish grey w/ yellowish brown minor irregular patches. FS aa but no yellowish brown patches. Basal Contact trans. Sedimentary Structures intraclasts of unit A in unit B near the base, minor faults occur near top of the unit. Composition dominantly ls, 50 to 60% intraclasts of unit A occur at the base, w/ matrix comprising the remainder. Intraclasts are 2 cm by 5 mm in size, elongate parallel to bedding. This grades up into intraclastic zone in middle of unit, intraclasts are a m brownish grey, subequant, sbrd, avg size is 3 mm, A64B Sample/Slab/Thin Section Description (two samples) fresh surface colour; vwsk olive-brown (10YR 5/1), sedimentary structures; ooids w/ pressure solution contacts, basal contact of ooids is wavy and cuts across bedding, composition; 35% rd intraclasts, (min 1 mm, max 20 mm, mode 2.5 mm), are

mainly composed of microspar/f xyn spar, some contain ooids the vast majority of which are superficial w/ radial fibrous structure, 40% superficial ooids, mode is 0.5 mm, many are multi-nucleated types, fossils; 1 broken brach(?) frag, 10% microspar, 10% f xyn spar, size of xtals increase away from gn boundaries, therefore pore-filling cement, 5% interxyn porosity, misc; stylolites and pressure solution along ooid boundaries, CL; non-luminescent except for minor spar overgrowths between coated gns and minor spar along veinlets. Rock Name: sparry/intraclastic/coated gn microsparite.

BASE OF UNIT 39.25 TOP OF UNIT 58.75 THICKNESS 19.50

UNIT A65. Weathering Character semi-rec. Colour WS buff to chalky white. FS lt brownish grey. Basal Contact abrupt to trans depending on locality, planar to convex-up, trans upward to thinner beds. Bedding Character dominantly planar, locally mosaic to rubble breccia. Bed/Lam Thickness min 1 cm, max 7 cm, mode 4 cm, faint lams, laterally continuous over 0.5 m. Composition dolostone, gn size <0.05 mm (dolomicrite?), m grey chert nodules 3 cm by 5 cm are concentrated in upper 0.3 m of bed. Sedimentary Structures vugs. Fossils some questionable rd m grey very poorly preserved fossils. A65 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; vwk lt olive-brown (10YR 6/1), sedimentary structures; planar lams, minor low-amplitude stylolites, composition; 3% ostracods, mode 0.25 mm, most ostracod valves dissolved, however articulated ones are filled w/ spar. 65% microspar, 25% spar, 1% opaques. 1% chert is present between vein-lining spar, misc; fractures filled w/ f to m xyn spar, 5% fracture porosity. CL; non-luminescent except for tr hairline veinlets lined w/ spar that has bright luminescent overgrowths. Rock Name: sl ostracodal/sparry microsparite. A65a Sample Description m grey chert nodule 20 mm thick by 70 mm long in buff f xyn dolostone. A65b Sample/Slab Description fresh surface colour; calc dolostone is wk vlt yellowish-orange (10YR 7/2) and ls is vwk dk olive-brown (10YR 4/1), sedimentary structures; low-amplitude stylolites, planar lam, misc; dolomitization is fracture controlled because subvertical fractures sometimes separate calc dolostone on one side from ls on the other side, even though they are both part of the same bed, composition; 30% ostracods 250-300µm (dolomitic) in size, biconvex and spherical, most are articulated, shell is dolomitic. 20% microspar, 20% spar, 25% f xyn dolomite (50µm mode), textural relationships; dolomite is of 2 types-one is lt brown and inclusion-rich, the other is cloudy white, both occur together. Some spar fills space between euhedral dolomite xtals and may be the same generation as the vein-filling spar. Dolomitization is probably post-stylolitization, post-fracturing, 5% interxyn porosity. Rock Name: microsparitic/f xyn sparitic ostracodal f-xyn dolostone. A65c Sample/Slab Description (of breccia), fresh surface colour; wk vlt yellowish orange (10YR 7/2), composition; 15% vug-lining spar between clasts, xtals to 1 mm, size increases away from clast boundaries, tr bitumen between clasts, 10% interclast porosity, vugs to 5 mm, 70% clasts are larger than 2 mm in size, min clast size-2 mm, max size-30 mm, modal size-10 mm, clasts are composed of microsparite. Rock Name: f-c calcirudite-sized breccia; microsparite 'clast'-sparite 'matrix' mosaic to rubble breccia. BASE OF UNIT 58.75 TOP OF UNIT 60.05 THICKNESS 1.30

UNIT A66. Weathering Character prom. Colour WS lt brownish grey w/ abundant yellowish brown weathering patches, covered w/ black lichen. FS m brownish grey. Basal Contact abrupt, wavy. Bedding Character massive, locally brecciated. Bed/Lam Thickness 1 m, lams are crenulated, wavy structures. Composition calc dolostone crackle breccia, minor irregular carb parting, gn size 0.1 mm. Sedimentary Structures high-amplitude stylolites. Misc very well indurated. A66 Sample/Slab Description (taken near the base of the unit), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; high-amplitude stylolites in a stylo-breccia, composition; 15% f-c xyn spar, 5% chert to 2 mm, mode 0.5 mm, bounded by stylolites, 1% black residue along stylolites, 5% porosity between xtals and clasts, 74% microspar/f xyn spar. Rock Name: microsparitic f xyn sparite crackle (stylo-) breccia. BASE OF UNIT 60.05 TOP OF UNIT 61.05 THICKNESS 1.00

UNIT A67. Weathering Character semi-prom, 3 sq m exposure. Colour WS lt grey w/ yellowish brown irregular patches. FS lt grey. Basal Contact covered. Bedding Character

rubble breccia. Composition breccia, 60% lam calc dolostone sbrd, subequant, randomly oriented clasts (10 cm modal size), 20% clast moulds, 40% calc 'matrix'.

BASE OF UNIT 61.05 TOP OF UNIT 66.05 THICKNESS 5.00

UNIT A68. Weathering Character semi-rec. Colour WS yellowish brown. FS chalky white.

Basal Contact obscured. Bedding Character planar bedded, sl wavy near upper contact.

Bed/Lam Thickness min 1 cm, max 3 cm, mode 2 cm, faint lams. Composition microxyn ls.

BASE OF UNIT 66.05 TOP OF UNIT 66.45 THICKNESS 0.40

UNIT A69. Weathering Character semi-prom. Colour WS and FS lt grey. Basal Contact

abrupt, wavy. Bedding Character stratified breccia. Composition stratified calc dolostone

rubble breccia, clast size 2 cm, sbrd, long axes are parallel to bedding. Sedimentary Structures

high-amplitude stylolites. Misc very well indurated. A69 Sample/Slab/Thin Section

Description fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures;

stylolites w/ 2 mm amplitude, composition; 5% interxyn and 5% gypsum(?) xtal mouldic

porosity, 90% f xyn spar. CL; non-luminescent except for bright orange-luminescent

subvertical veinlets, spar has non-luminescent cores and bright orange luminescent

overgrowths. Rock Name: stylolitic f xyn sparite to crackle (stylo-) breccia.

BASE OF UNIT 66.45 TOP OF UNIT 66.75 THICKNESS 0.3

UNIT A70. Weathering Character semi-prom. Colour WS yellowish brown. FS chalky white.

Same as A68, only locally brecciated, in part also thicker bedded. Basal Contact abrupt, very

regular. Bedding Character planar, locally brecciated. Bed/Lam Thickness min 1 cm, max 3

cm, mode 2 cm, in part thicker bedded, faintly lam. Composition microxyn ls, locally

brecciated. Sample A70a(conodonts) taken. A70 Sample/Slab/Thin Section Description (rep

litho sample), fresh surface colour; wk vlt yellowish orange (10YR 7/2), misc; minor

stylolites and subvertical fractures, composition; 90% f xyn spar, 5% f xyn dolomite (20 μ m in

size), randomly distributed. 5% interxyn porosity. Rock Name: sl dolomitic f xyn sparite.

BASE OF UNIT 66.75 TOP OF UNIT 68.55 THICKNESS 1.80

UNIT A71. Weathering Character semi-prom. Colour WS lt grey w/ yellowish brown patches.

FS lt grey. Basal Contact abrupt, wavy irregular. Bedding Character rubble breccia.

Composition breccia, 60% clasts, 30% calc matrix, 10% vugs, clast size to 10 cm, long-axes

subparallel bedding. Sedimentary Structures low-amplitude stylolites. Misc forms prom ledge

of uniform thickness on other side of valley. A71 Sample/Slab/Thin Section Description

(taken near base of unit), fresh surface colour; st vlt yellowish-orange (10YR 7/4),

sedimentary structures; low-amplitude stylolites, composition; 95% f xyn spar clast breccia, 5%

porosity along stylolites and between clasts, 50% breccia clasts larger than 2 mm, range of

clast sizes is 2 to 25 mm, mode 8 mm. CL; orange-luminescent and zoned spar (20%) (mainly

larger xtals) as veins through non-luminescent breccia clasts and as cement in porous more

xyn breccia clasts. Calcite of breccia clasts luminesces a very dull orange and the 'matrix'

luminesces bright orange (as overgrowths on non-luminescent cores). Rock Name: f-c

calcirudite-sized breccia; f xyn sparite 'clast/matrix' rubble breccia.

BASE OF UNIT 68.55 TOP OF UNIT 69.55 THICKNESS 1.00

UNIT A72. Weathering Character rec covered interval.

BASE OF UNIT 69.55 TOP OF UNIT 70.05 THICKNESS 0.50

UNIT A73. Weathering Character semi-rec. WS and FS buff yellowish brown patches oriented

parallel to bedding. Basal Contact covered. Bedding Character small convex-up structures at

base pass up to convex-up structures (to 0.75 m wide). Bed/Lam Thickness lams to 1 cm

thick, lams of convex-up structures generally 1 mm thick. Composition dolomitic ls.

Sedimentary Structures large convex-up structures, slickensides and high-amplitude stylolites.

A73 Sample/Slab Description fresh surface colour; lt olive-brown (10YR 6/3), sedimentary

structures; 2 mm amplitude stylolites, slickensides all parallel and developed on folded strata,

therefore slickensides associated w/ faulting, composition; 90% f xyn spar, 5% interxyn and

5% gypsum(?) xtal mouldic porosity. Rock Name: f xyn sparite.
BASE OF UNIT 70.05 TOP OF UNIT 71.55 THICKNESS 1.50

UNIT A74. Weathering Character semi-prom. Colour WS lt grey. FS lt grey w/ minor greenish patches (possible malachite staining). Basal Contact abrupt, wavy. Bedding Character mosaic to rubble breccia. Composition dominantly ls breccia, clasts 70%, matrix 30% (possibly calc), minor clast moulds, clasts elongate and parallel to bedding, subequant, sbang, 4 cm max, mode 1 cm, poorly sorted. Sedimentary Structures high-amplitude stylolites. A74 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; breccia, overall wk vlt yellowish orange (10YR 7/2), sedimentary structures; 3 mm amplitude stylolites, composition; 60% breccia clasts greater than 2 mm in size, clast size range-2 to 30 mm, mode 6 mm, 3% white and 5% clear chert clasts, the rest are f xyn sparite. 5% porosity, 5% microspar 'matrix'. CL; non-luminescent breccia 'clasts', 'matrix' contains non-luminescent spar w/ bright orange-luminescent overgrowths. Rock Name: cherty f xyn sparite 'clast' microsparite 'matrix' mosaic to rubble breccia.
BASE OF UNIT 71.55 TOP OF UNIT 72.25 THICKNESS 0.70

UNIT A75. This unit can be seen across the stream forming part of the interbedded buff and lt grey prom sequence. Both units A64 and A75 are prom. Unit A75 contains the same 2 litho (A and B) as that of unit A64 and in this respect the two units are quite similar. Another zone 1.5 m thick containing hummocky structures occurs 8 m abu. Across the stream the buff beds are thicker in A75 than in A64 and approach 1.5 m in thickness. Bedding Character hummocky.
BASE OF UNIT 72.25 TOP OF UNIT 84.25 THICKNESS 12.00

UNIT A76. Weathering Character rec covered interval with perhaps a small breccia outcrop containing hummocky structures 45-50 cm wide and 25 cm high. Breccia occurs between the hummocks. Bedding Character hummocky.
BASE OF UNIT 84.25 TOP OF UNIT 96.50 THICKNESS 12.25

UNIT A77. Moved upstream 1.8 km north of section Ac start and picked prom unit on the valleys' west side. Section Ad (units 77-87) starts at lat. 73°18'26"N, long. 88°33'00"W, section Ad(units 77-87) ends at lat. 73°8'32"N, long. 88°33'5"W. Units A77 to the breccia form the prom ridge traceable up valley. Start section north of small tributary on west side. Weathering Character semi-rec. WS and FS chalky white. Basal Contact covered. Bedding Character massive, locally contorted (kink folds). Composition calc dolostone, gn/xtal size 0.1 mm. Misc well indurated. A77 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; massive, composition; 60% peloids (composed of microspar), size mode 200µm, range 100 to 300µm, 20% spar, 20% moulds and vugs to 1 by 6 mm. CL; dull semi-opaque moderate orange luminescent irregularly-shaped 'clots' composed of microspar(?) w/ dull orange-luminescent peloids. Spar between peloids is non-luminescent. FLUOR; lt fluorescent peloids, cement between peloids is non-fluorescent. Rock Name: pelsparite.
BASE OF UNIT 96.50 TOP OF UNIT 97.10 THICKNESS 0.60

UNIT A78. Weathering Character semi-rec. Colour WS m grey. FS lt to m grey. Basal Contact abrupt, planar. Bedding Character planar. Bed/Lam Thickness min 1 cm, max 8 cm, mode 3.5 cm, lams 0.5 to 2 mm, laterally continuous for at least 0.5 m. Composition calc dolostone, probably argil, gn/xtal size <0.1 mm, dolomite xtals to 0.5 mm in size, lt lams, intraclasts to 0.5 mm in size near top of unit. Misc This unit and A77 are both involved in local deformation (kink folds). A78 Sample/Slab/Peel Description fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; wispy discontinuous stylolites, planar lams, composition; 85% microspar, 10% f to c xyn spar, 5% porosity. Rock Name: sparry microsparite.
BASE OF UNIT 97.10 TOP OF UNIT 97.50 THICKNESS 0.40

UNIT A79. Weathering Character semi-prom. WS and FS lt grey. Basal Contact abrupt planar. Bedding Character planar, locally kink folded. Bed/Lam Thickness min 1 cm, max 6 cm, mode 2-3 cm, lt and dk lams 1 to 2 mm thick, laterally continuous over at least 0.5 m. Composition calc dolostone, minor lens-like vugs? lined w/ spar to 2 mm in size. A79 Sample/Slab/Thin Section Description fresh surface colour; overall wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-angle cross-lams, misc; minor fractures, low-angle cross-lam filled w/ spar, composition; 5% spar, 2% pyrite, 83% f xyn dolomite (size mode 30 μ m), 10% interxyn porosity. CL; non-luminescent spar veinlet. Dull uniform orange-luminescent dolomite xtals. Rock Name: sl sparry f xyn dolostone.
BASE OF UNIT 97.50 TOP OF UNIT 98.00 THICKNESS 0.50

UNIT A80. Weathering Character prom. Colour WS lt to m grey w/ yellowish brown irregular beds parallel to bedding and along joint surfaces. FS lt to m grey. Basal Contact abrupt planar. Bedding Character planar, locally kink-folded. Bed/Lam Thickness min 2 cm, max 20 cm, mode 5 cm, faint 2 mm lam, uniformly thick throughout. Composition dolomitic ls, gn size microxyn, possibly sl argil. A80 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; planar lams, misc; many fractures filled w/ f-m xyn spar, composition; 30% micrite, 39% microspar, 10% spar, 1% dispersed pyrite but more concentrated along stylolites, 15% vf-f xyn dolomite, randomly dispersed, 5% interxyn porosity. CL; non-luminescent spar veinlets in a very dull orange luminescent microsparite. Rock Name: sl brecciated sparry/micritic/dolomitic microsparite.
BASE OF UNIT 98.00 TOP OF UNIT 99.25 THICKNESS 1.25

UNIT A81. The bases of units A81 and A89 are correlative. Weathering Character semi-rec. WS and FS m grey. Basal Contact abrupt planar. Bedding Character planar. Bed/Lam Thickness beds 15 cm thick, lams laterally continuous. Composition ls, possibly argil. Misc papery bedding plane parting. Sample A81 (conodonts) taken, A81 Sample/Slab Description (rep litho sample), fresh surface colour; wk vlt orangy-yellow (10YR 7/2), 60% microspar, 30% randomly dispersed f xyn dolomite, rhomb size mode is 25 μ m, 10% interxyn porosity. Rock Name: dolomitic (f xyn) microsparite.
BASE OF UNIT 99.25 TOP OF UNIT 99.40 THICKNESS 0.15

UNIT A82. Weathering Character semi-rec. WS and FS m grey. Basal Contact abrupt planar. Bedding Character planar. Bed/Lam Thickness 15 cm, lams laterally continuous and of uniform thickness. Composition ls, chert nodules occur just below upper contact, black chert nodules are 30 cm long (elongate parallel to bedding) and 2 cm thick.
BASE OF UNIT 99.40 TOP OF UNIT 102.20 THICKNESS 1.40

UNIT A83. Weathering Character semi-rec to prom. WS and FS lt to m grey. Basal Contact trans over 20 cm. Bedding Character planar. Bed/Lam Thickness min 2 mm, max 3 cm, mode 1 cm, lams continuous laterally over at least 0.5 m. Composition ls, possibly argil. Misc 30° dip NNW due to local deformation. A83 Sample/Slab Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; sl wavy lams, composition; 20% patches of f xyn dolomite consist of 50 μ m-sized rhombs, 5% interxyn porosity, 75% microspar. Rock Name: dolomitic (f xyn) microsparite.
BASE OF UNIT 102.20 TOP OF UNIT 103.45 THICKNESS 1.25

UNIT A84. Weathering Character semi-prom to semi-rec. Colour WS lt brownish grey. FS lt grey. Basal Contact trans over 3-4 cm, planar. Bedding Character planar, very sl wavy, lower 0.5 m is thick bedded, middle part of unit has 1 cm thick lams. Bed/Lam Thickness lower zone (min 5 cm, max 9 cm), middle zone (min 1 cm, max 3 cm), upper zone (min 5 cm, max 9 cm). Composition ls, or sl dolomitic ls, gn size approx 0.2 mm. Sedimentary Structures planar bedding, chert nodules to 20 cm (in all zones elongate parallel to bedding), high-amplitude stylolites. Some black chert is lens-shaped in cross-section. A84 Sample/Slab/Thin Section Description (taken from lower more thickly bedded zone, contains

bitumen and carb lams on bedding surfaces), fresh surface colour; wk lt olive-brown (10YR 6/2), stylolites w/ 1 mm amplitude, planar lam, composition; 25% elongate intraclasts (mode 0.2 mm by 3 mm, composed of microspar), 50% peloids, most composed of spar and dolospar but some of microspar (100 μ m size mode), 20% f xyn spar, tr pyrite, tr silica replaces dolomite, 15% f xyn dolomite (size mode is 30 μ m), dolospar preferentially occurs in peloids, 5% interxyn porosity. CL; isolated moderate orange luminescent spar (5%) mainly in veins and xtals (some zoned) scattered uniformly throughout the sample. Otherwise, the sample is non-luminescent. Rock Name: dolomitic intraclastic pelsparite. Misc bitumenous odour on striking.

BASE OF UNIT 103.45 TOP OF UNIT 105.45 THICKNESS 2.00

UNIT A85. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact abrupt wavy (10 cm amplitude w/ 1 m wavelength). Bedding Character indistinct, planar irregular and laterally discontinuous. Bed/Lam Thickness min 4 cm, max 8 cm, mode 5 cm, carb, dk grey. Composition ls w/ uniform gn size <0.1 mm. Sedimentary Structures high-amplitude stylolites. A85 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; extensive stylolites w/ up to 2 mm amplitude, composition; 5% intraclasts (mode 0.2 mm by 5 mm), 48% peloids, size mode 100 μ m, 20% microspar, 15% spar, 2% silica pseudomorphs after carbonate, 15% dolomite (preferentially concentrated along stylolites and in peloids), 10% interxyn porosity. CL; 5% uniformly scattered orange-luminescent overgrowths on non-luminescent cores in porous patches. FLUOR; brown fluorescence along stylolites. Rock Name: sparry/dolomitic intraclastic pelmicrosparite.

BASE OF UNIT 105.45 TOP OF UNIT 106.25 THICKNESS 0.80

UNIT A86. Weathering Character rec covered interval.

BASE OF UNIT 106.25 TOP OF UNIT 109.55 THICKNESS 3.30

UNIT A87. Weathering Character semi-rec. Colour WS buff to lt brownish grey. FS lt brownish grey. Basal Contact covered. Bedding Character hummocky. Bed/Lam Thickness min 0.4 m, max 0.6 m (2 beds only). Composition calc dolostone, m brownish 1 mm-sized irregular patches comprising 15% peloids, are scattered in a microxyn matrix. Sedimentary Structures rd chert nodules (30 cm by 2 cm), nodule curvature parallels convex-up curvature of bed. Main chert nodule occurs 5 cm below the A87/88 contact, high-amplitude stylolites. A87 Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; vague planar lam, composition; 20% f xyn spar as pseudomorphs after gypsum, euhedral outlines of gypsum preserved, 5% interxyn porosity, 75% f xyn dolomite, peloidal texture. CL; composite spar pseudomorphs after gypsum are non-luminescent except for thin bright-orange luminescent coatings. The dolostone luminesces a dull cloudy-red, the intensity of which varies from place to place. Also, there are non-luminescent 'haloes' around the gypsum pseudomorphs and non-luminescent 'ghosts' of former gypsum xtals. Rock Name: sparry vf xyn dolostone.

BASE OF UNIT 109.55 TOP OF UNIT 110.55 THICKNESS 1.00

UNIT A88. Massive breccia pipe forms very high localized outcrop. This is one of the only places along the stream cut where a prom unit crops out in an otherwise covered succession. The unit is a local breccia pipe about 35 m high. Weathering Character prom. Colour WS and FS buff. Basal Contact abrupt, hummocky. Bedding Character trans upward from crackle to rubble breccia, clast size is inversely graded. Composition clasts 80%, matrix 20%, clast-supported, randomly oriented w/ lam at right angles to regional bedding, clast size 10 cm. Chert nodules are dominantly lt grey, some brownish grey, size 30 by 2 cm. 'Matrix' sample of A88 taken 2 m abu, includes some clasts. Misc farther upstream there is less exposure. A88 Sample/Slab/Thin Section Description (two samples taken 2 m abu), fresh surface colour; wk xlt orangy-yellow (2.5Y 8/2), misc; dolomitic areas are very porous, composition; 20% microspar, 15% f to m xyn spar, 50% m xyn dolomite (100 μ m mode), 15% interxyn sample porosity, calcified dolomite com. CL; overall dull orange-luminescent

dolomite and non-luminescent spar. Rock Name: sparry microsparitic m xyn dolostone.
BASE OF UNIT 110.55 TOP OF UNIT 145.00 THICKNESS 80.00

UNIT A89. Sub-section Ae (units A89-100). The bases of A89 and A81 are correlative. Section Ae starts at lat. 73° 17' 24" N, long. 88° 34' 30" W and ends at lat. 73° 17' 32" N, long. 88° 35' 36" W. Section Ae starts 2.2 km south of Ad87. Weathering Character semi-prom, poor exposure, differential weathering of dolostone. Colour WS and FS m brownish grey. Basal Contact covered. Bedding Character indet. Bed/Lam Thickness 0.5 m assumed. Composition microxyn dolomitic ls, dolomite weathers out (1% of rock). Dolomite rhombs are 1 mm-sized multixtal aggregates. A89 Sample/Slab/Thin Section Description (taken just below A89/90 contact), fresh surface colour; wk vlt orangy-yellow (2.5Y 7/2), misc; fractured, composition; 100% stromatoporoid, 85% f to m xyn (minor c xyn) spar, 15% porosity. CL; bright orange-luminescent calcite in recrystallized areas of stromatoporoid and in veins. 'Tissue' of stromatoporoid luminesces dull orange. Rock Name: stromatoporoid filled w/ f-m xyn spar.

BASE OF UNIT 0.00 TOP OF UNIT 0.50 THICKNESS 0.50

UNIT A90. Weathering Character semi-rec. Colour WS lt yellowish brown to buff, irregular weathering surface (bryozoans? are a m yellowish brown). FS lt buff. Basal Contact abrupt, planar irregular. Bedding Character planar, irregular. Bed/Lam Thickness min 5 cm, max 15 cm, mode 10 cm. Composition dolomitic ls, gn size 0.2 mm, dolomite weathers out to produce a ragged surface (as in the last unit), 10% dolomite rhombs. Fossils comprise 40% of rock, poorly preserved dolomitic ossicles along bedding plane surfaces, stick bryozoans? intact, straight to sl curved, about 3 mm wide and up to 4 cm long. The bryozoans? are mostly randomly oriented. A90 Sample/Slab/Thin Section Description fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), composition; 30% stick bryozoans (in part dolomitic), 4 mm diameter, 25% f-m xyn spar, 15% vf xyn dolomite (45% dolomite in total), 30% interxyn porosity, mainly in the dolomitic parts, misc; spar is post-dolomite because it is pore-filling and the dolomite is pore-lining. CL; non-luminescent except for 5% orange-luminescent zoned overgrowths (especially vug fillings on non-luminescent spar cores). FLUOR; very com zoned dolomite. Rock Name: sparry (f-m xyn) bryozoan? vf xyn dolostone.

BASE OF UNIT 0.50 TOP OF UNIT 0.80 THICKNESS 0.30

UNIT A91. Weathering Character rec covered interval but is probably similar to A90. Fossils ossicles in clasts throughout the unit.

BASE OF UNIT 0.80 TOP OF UNIT 4.30 THICKNESS 3.50

UNIT A92. This unit is the marker bed traced upstream. Weathering Character prom. Colour WS m brownish grey, in places dk grey due to lichen covering wet surfaces. FS m grey rind (1 mm thick), see litho sample A92. Basal Contact covered. Bedding Character planar, sl irregular. Bed/Lam Thickness min 2.5 cm, max 13 cm, mode 4 cm, lams faint on weathered surfaces, are laterally continuous and dominantly planar. Lt lams are 0.5 mm thick, dk ones are 1 mm thick and alternate throughout. Composition microxyn ls, 2-3 cm sized spar lines joint surfaces. A92 Sample/Slab/Peel Description (rep litho sample taken 1.2 m abu), fresh surface colour; wk m brownish olive (2.5Y 5/2) w/ grey chert nodules, sedimentary structures; chert nodules to 5 cm in size, elongate parallel to bedding which is traceable through the nodule, low-amplitude stylolites, misc; drape of strata around chert nodules (compaction or pressure solution?), composition; 10% chert, 85% microspar, 5% interxyn porosity. Rock Name: chert (nodular) microsparite. Sample A92 (conodonts) taken.

BASE OF UNIT 4.30 TOP OF UNIT 6.50 THICKNESS 2.20

UNIT A93. Weathering Character rec covered interval. However, large colonial corals to 0.5 m wide occur in scree. A93 Sample/Slab Description fresh surface colour; wk xlt orangy yellow (2.5Y 8/2), composition; dolostone.

BASE OF UNIT 6.50 TOP OF UNIT 27.50 THICKNESS 21.00

UNIT A94. Weathering Character prom. Colour WS and FS lt grey. Basal Contact covered. Bedding Character very irregular. Bed/Lam Thickness min 2 cm, max 40 cm, mode 15 cm. Composition calc dolostone, convex-up (possibly due to dissolution of brachs), long-axes are parallel to bedding, 10% vugs to 2 cm in size. 15% interxyn porosity. Fossils 2-3% ossicles, intact stems up to 2 cm-long occur on bedding planes, also some sparse very poorly preserved brachs (<1%). Some dissolution along irregular bedding planes. Misc extremely fractured. A94 Sample/Slab/Thin Section Description fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), composition; brach moulds, 20% 4 mm-diameter ossicles. 1% spar and 1% pyrite pore-fillings between dolomite rhombs, 3% interxyn bitumen, 60% cloudy m xyn dolomite rhombs (mode 125 μ m), dolomite is zoned (inclusion-rich and poor zones), fracture-related veins consist of inclusion-free limpid m xyn dolomite, 15% interxyn porosity. CL; 3% bright orange-luminescent dolomite overgrowths. FLUOR; multi-fold complex zonation of most of the dolomite. Rock Name: ossicle-rich m xyn dolostone.
BASE OF UNIT 27.50 TOP OF UNIT 31.10 THICKNESS 3.60

UNIT A95. Now at outcrop just north of camp. Weathering Character prom to semi-prom, 1 sq m exposure. Colour WS buff and lt grey. FS lt grey. Basal Contact covered. Bedding Character planar, flaggy to papery parting. Bed/Lam Thickness min 1 mm, max 6 cm, mode 1 cm, lams alternate dk and lt, lateral continuity over at least 0.5 m. Composition microxyn ls, questionably argil. Fossils large orthocone siphuncles occur in scree just below this unit. A95 Sample/Slab/Thin Section Description fresh surface colour; wk vlt orangy-yellow (2.5Y 7/2), sedimentary structures; planar lam, stylolites are extensive but of low-amplitude, composition; 44% microspar, 44% spar, 1% hematite(?), 1% limonite(?) as <1 μ m-sized dispersed mat'l, 10% interxyn porosity. Rock Name: microsparitic f xyn sparite. A95a Sample/Slab Description fresh surface colour; wk vlt orangy-yellow (2.5Y 7/2), sedimentary structures; vague planar bedding, misc; fractured, porosity/ permeability is higher near fractures, composition; 85% f xyn spar (50 μ m mode), 15% porosity (5% fracture, 10% interxyn porosity). CL; generally dull orange-luminescent spar w/ minor bright orange-luminescent overgrowths. Rock Name: f xyn sparite.
BASE OF UNIT 31.10 TOP OF UNIT 31.55 THICKNESS 0.45

UNIT A96. Weathering Character prom. WS and FS m brownish grey. Basal Contact trans over 5 cm, planar. Bedding Character planar irregular. Bed/Lam Thickness min 1 cm, max 8 cm, mode 4.5 cm. Composition ls w/ intraclasts, inversly size-graded, clasts to 3 cm by 8 mm in size, possibly peloidal. Sedimentary Structures high-amplitude stylolites. A96 Sample/Slab/Peel Description (taken from middle of unit) fresh surface colour; wk lt orangy-yellow (2.5Y 6/2), sedimentary structures; stylolites w/ up to 1 mm amplitude, composition; 75% intraclasts range from 0.1 to 5 mm, mode 0.5 mm (are composed of 10% micrite and 65% microspar), 20% m xyn spar, 5% interxyn porosity. Rock Name: intrasparite.
BASE OF UNIT 31.55 TOP OF UNIT 32.05 THICKNESS 0.50

UNIT A97. Weathering Character prom. WS and FS m brownish grey. Basal Contact abrupt planar. Bedding Character planar irregular, very sl wavy irregular. Bed/Lam Thickness mode 1 to 2 cm, faint lam. Composition microxyn ls. A97 Sample/Slab/Peel Description (rep litho sample), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; minor stylolites w/ 0.5 mm max amplitude, planar lam, composition; 75% intraclasts (composed of microspar), variable in size from calcitute to f calcarenite, 20% microspar, 5% interxyn porosity. Rock Name: interlam calcitute and f calcarenite: intramicrosparite. Sample A97 (conodonts) taken.
BASE OF UNIT 32.05 TOP OF UNIT 32.90 THICKNESS 0.85

UNIT A98. Weathering Character prom, only 0.5 sq m outcrop. Colour WS m brownish grey. FS lt to m grey. Basal Contact trans. Bedding Character indet, appears to be unbedded but only 0.5 sq m is exposed. Bed/Lam Thickness 1 bed only, unlam. Composition very sl dolomitic ls. A98 Sample/Slab/Peel Description (taken from the middle of the unit), fresh surface colour; wk vlt orangy-yellow (2.5Y 7/2), composition; intraclasts(?) or diagenetic

clotted texture(?), one 10 mm wide articulated and plicated brach, thin-shelled (only 50 μ m thick), in part broken, shell microstructure is fibrous and parallel to valve boundaries, peloids(?) or diagenetic clotted texture(?), 85% micrite/microspar, 10% f xyn spar, 5% interxyn porosity. Rock Name: sparry micritic microsparite.

BASE OF UNIT 32.90 TOP OF UNIT 33.20 THICKNESS 0.30

UNIT A99. Weathering Character rec covered interval rich in large orthocone siphuncles, large colonial corals, and abundant echinoderms. A99 Scree Sample Description fresh surface colour; wk xlt orangy yellow (2.5Y 8/2), numerous samples of poorly preserved dolomitic siphuncles of orthocones, oblong in cross-section w/ max diameter to 35 mm, connecting rings to 7 mm wide, max length of siphuncle segments is 19 cm. A99b Scree Sample/Slab/Thin Section Description (of a typical *Catenipora*), a transverse section through the center of a siphuncle, fresh surface colour; wk xlt orangy-yellow (2.5Y 8/2), misc; tr malachite, composition; one dolomitic orthocone siphuncle, annulosiphonate deposits consist of lamellar dolomite xtals, 40% ossicles (dolomitic), 4% f xyn spar cements dolomite xtals and in addition lines limpid dolomite pore-lining cement, 31% f-m xyn inclusion-rich dolomite, minor limpid dolomite lines vugs, 25% porosity (5% vugs, 20% interxyn). Rock Name: fossiliferous f-m xyn dolostone. Fossils coral in growth position.

BASE OF UNIT 33.20 TOP OF UNIT 44.70 THICKNESS 11.50

The base of A100 is taken as the contact between the upper and lower members of the Cape Crauford Formation.

UNIT A100. Weathering Character prom. WS and FS buff. Basal Contact covered. Bedding Character basal 2 m is massive. Composition argil dolostone, gn/xtal size 0.4 mm, some dolomite rhombs to 2 mm in size. At least 10% interxyn porosity, 25% rd vugs, 2 to 3 cm modal size, ellipsoidal shapes, 10% are filled w/ yellowish brown spar. The vugs are uniformly distributed-however concentration increases toward the top of the unit, good fracture porosity. Sedimentary Structures vugs, slickensides, convex-up structures, tr stylolites. Fossils <1% brachs, tr ossicles, in places up to 5 mm long echinoderm stems oriented horizontally. Ghost texture of stromatolites or stromatoporoids?. Moulds of corals and very poorly preserved fossils. A100 Sample/Slab/Thin Section Description (taken about 5 m abu), fresh surface colour; wk vlt orangy-yellow (2.5Y 7/2), sedimentary structures; vugs to 2 cm by 1 cm in size, composition; 5% spar between dolomite rhombs and lining vugs, 80% m xyn dolomite (125 μ m mode), larger rhombs have cloudy centers and clear rims, 15% porosity (5% as vugs, 10% interxyn), fracture-filling veins are composed of spar, high spar concentration near fractures, tr malachite xtals (25 μ m mode) on c xyn vug-lining spar. CL; generally dull luminescent dolomite, however, tr bright orange-luminescent coatings on vug-lining dolomite (on surfaces exposed to pore space). Clear dolomite overgrowths are non-luminescent and occur on dull orange-luminescent inclusion-rich dolomite cores. FLUOR; all the dolomite shows multi-fold complex zonation. Rock Name: vuggy/sl sparry m xyn dolostone. Sample A100a contains a small mould of a colonial coral and is lined w/ brown spar, tr stylolites. Sample A100b contains spar-filled vugs. A100c Sample/Slab/Thin Section Description (unoriented dolomitized coral), fresh surface colour; wk lt orangy yellow (2.5Y 7/2), composition; one 10 cm-sized dolomitized poorly preserved *Catenipora* (20%), 3% spar as vein-filling fractures and spar lining vugs, minor spar fills pores between dolomite xtals, 62% m-c xyn dolomite, (modal size 225 μ m), 15% porosity (5% in corallites and 10% between xtals). Rock Name: coralline m-c xyn dolostone. A100d Sample/Slab Description fresh surface colour; wk lt orangy yellow (2.5Y 7/2), sedimentary structures; massive, w/ possible ghost texture of original wispy mottles, porosity in ghost mottles is 35%, dolomite in ghost mottles has few inclusions and is com leached, composition; 5% tabular stromatoporoid (dolomitic) (7 mm by 12 cm long), 10% ossicles to 5 mm diameter, 2% bitumen, 68% m xyn dolomite (100 μ m mode), has inclusion-rich cores and clear rims, 15% interxyn porosity. CL; some of the dolomite xtals filling vugs have alternating bright and non-luminescent zones. One bright pink luminescent xtal of fluorite(?) in a porous mottle, minor fluorite luminesces a uniform blue. FLUOR; most dolomite is complexly zoned, minor dolomite in more porous

areas (relict mottles?). Rock Name: fossiliferous m xyn dolostone.
BASE OF UNIT 44.70 TOP OF UNIT 50.70 THICKNESS 6.00

B. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION B, MEASURED IN 1982.

Locality: North central Jackson Inlet
Latitude: 73°18'25"N.
Longitude: 88°44'30"W.

Section B starts at lat. 73°18'21"N, long. 88°44'27"W about 10 m asl and ends at lat. 73°18'32"N, long. 88°44'40"W. The start of section B is 6.1 km west of section A. Base camp is at lat. 73°17'19"N, long. 88°35'24"W.

The base of section B is within member B of the Baillarge Formation.

UNIT B1. Weathering Character prom. Colour WS and FS m brownish grey overall, lt and dk lams. FS aa but lighter. Basal Contact obscured by stream. Bedding Character sl wavy, locally brecciated. Bed/Lam Thickness min 1 cm, max 20 cm, mode 10 cm, dk lams are 0.5 to 2 mm thick, lt lams are thinner. Composition dolostone, locally mosaic to rubble breccia, minor carb lams, microxyn gn size <0.1 mm. Sedimentary Structures hummocky structures. B1 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; planar lam, low-amplitude stylolites, composition; tr spar, 4% dk brown dolomite inclusions, 1% interxyn bitumen, 80% f xyn dolomite (50µm mode), 15% interxyn porosity. CL; 5% bright orange-luminescent limpid dolomite (some is non-luminescent), mainly as vug-fillings. Most of the dolomite is non-luminescent. Rock Name: f xyn dolostone.
BASE OF UNIT 0.00 TOP OF UNIT 2.00 THICKNESS 2.00

UNIT B1a. On west side of stream—Weathering Character prom. Colour WS m brownish grey overall, lt and dk lams. FS aa but lighter. Basal Contact obscured by stream. Bedding Character crackle to rubble breccia w/ sub-parallel to rotated large clasts in breccia. Composition 80% clasts. 20% 'matrix' is composed of large euhedral spar 2 cm long by 8 mm wide oriented perpendicular to clast boundaries. B1a Sample/Thin section Description fresh surface colour; m olive-brown (10YR 5/3) clasts and wk xlt yellowish-orange (10YR 8/2) spar 'matrix', composition; dolostone clast breccia, 30% f to extremely c xyn spar, xtal size increases away from the clast boundaries, 60% breccia clasts range from 2 to 45 mm in size, mode 20 mm, clast composition is lam f-m xyn dolospar w/ 15% porosity. CL; orange-luminescent 'matrix' of zoned spar cement between non-luminescent dolostone clasts. FLUOR; sharp zonation of spar between clasts. Rock Name: c calcirudite-sized breccia; f to m xyn dolostone 'clast' spar 'matrix' crackle to rubble breccia. B1b Sample/Thin Section Description fresh surface colour; m olive brown (10YR 5/3), sedimentary structures; planar lams, low-amplitude stylolites, tr pore-filling spar, pore-lining cement consists of euhedral dolomite rhombs containing 5% opaque inclusions, 85% f to m xyn dolomite (50µm mode), 15% interxyn porosity. CL; 2% bright orange-luminescent pore-filling spar in an otherwise non-luminescent dolostone. FLUOR; tr zoned dolomite in porous areas. Rock Name: f-m xyn dolostone.

UNIT B2. Weathering Character prom. Colour WS mottled lt grey and m-dk grey, yellowish brown patches. FS lt to m grey. Basal Contact trans, is both lam and mottled and 20 to 50 cm thick. Bedding Character planar irregular, wavy (wavelength 2 cm, amplitude 5 mm). Bed/Lam Thickness min 2.5 cm, max 20 cm, mode 6 cm. Composition dolostone breccia w/ possible minor argil content. Sedimentary Structures brecciation throughout. Fossils ostracods occur only on some bedding planes, not throughout the unit. They are 1 cm in size and

occupy 5% of bedding surfaces although in cross-section their apparent abundance is 15%. B2 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; planar lam and wispy low-amplitude stylolites marked by discontinuous opaque films, composition; 15% poorly preserved articulated ostracods to 17 mm in size, valve is 125 μ m thick and dolomitic, 4% m xyn spar (125 μ m mode), 3% opaques, 73% f xyn dolomite (50 μ m mode), 5% interxyn porosity. Rock Name: ostracodal f xyn dolostone. B2a Sample/Slab Description (includes ostracods on a bedding plane), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; wispy low-amplitude stylolites, composition; 15% ostracods to 8 mm in size, patches occur where 5% spar fills pores between dolomite rhombs, 85% m xyn dolomite, some vugs lined w/ limpid dolomite and filled w/ m xyn spar, 10% interxyn porosity. CL; limpid dolomite lining vugs is non-luminescent, 3% spar filling dolomite-lined vugs varies from dull to bright orange-luminescent. Rock Name: sl sparry ostracodal m xyn dolostone. Misc joint surfaces lined w/ 1 mm dolomite xtals, vst bitumenous odour upon striking.

BASE OF UNIT 2.00 TOP OF UNIT 3.50 THICKNESS 1.50

UNIT B3. Weathering Character prom. Colour WS and FS overall m grey (banded), m to dk grey beds, buff to brownish grey lams. Basal Contact trans over 5-10 cm, planar. Bedding Character planar, sl wavy, very irregular, possibly contorted. Bed/Lam Thickness lams are quite distinct, avg thickness 3 to 4 mm, varies laterally in thickness and is almost lensoidal in places. Composition microxyn (<0.1 mm) dolostone, 30% intraclasts to 2 cm long, are white and sbrd, abundant vugs in upper 0.5 m. Sedimentary Structures contorted bedding and intraclasts near upper contact, abundant vugs in upper 0.5 m of unit. Misc very well indurated, very dense, w/ vertical slickensides. In upper 0.5 m there is extensive vuggy porosity. Unit is fractured w/ numerous joints spaced 1 to 7 cm apart. B3 Sample/Slab/Thin Section Description (taken from base of unit), fresh surface colour; interbedded wk m olive-brown (10YR 5/2) and wk lt olive-brown (10YR 6/2), sedimentary structures; planar, sl wavy lam/bedding; numerous low-amplitude stylolites marked by carb films, misc; vein-filling fractures consist of f-vc xyn spar, size increases away from walls, composition; 1% spar as cement between dolomite rhombs and filling fractures, 2% opaques, 87% m xyn dolomite, 10% interxyn sample porosity. CL; generally non-luminescent dolomite w/ tr thin orange-luminescent overgrowths. Rock Name: m xyn dolostone.

BASE OF UNIT 3.50 TOP OF UNIT 6.10 THICKNESS 2.60

UNIT B4. Weathering Character prom. Colour WS and FS mottled, m to lt grey and lt brownish grey. Basal Contact abrupt planar. Bedding Character mottles at base have a planar fabric (mottle long-axes are parallel to bedding). Near the top of the unit the mottles become more randomly oriented and equidimensional. Bed Thickness very thick bedded. Composition dolostone w/ corals (5%), stromatoporoids and brachs, gn/xtal size 0.3 mm, 5% bitumen fills corallites and stromatoporoids. Sedimentary Structures mottles are sbrd to sbang, 1 cm wide near the base, 2 to 3 cm wide near the top of the unit such that there is an inverse grading of mottle size. Fossils 5% favositid corals and rare in situ solitary corals. The lowermost metre is unfossiliferous. Corals occur 18 m abu and a few brachs occur about 18.6 m abu. Tabular stromatoporoids (1 cm thick and 20 cm wide) 18 m abu. Misc extremely well indurated. B4 Sample/Slab/Thin Section Description (taken near top of unit, a few cup corals are on their side and one of these is broken), fresh surface colour; mottled wk lt olive-brown (10YR 6/2) and wk m olive-brown (10YR 5/2), sedimentary structures; wispy stylolites and mottles, composition; 15% ossicles to 5 mm in diameter, have dolomite syntaxial overgrowths, 2 small solitary corals 2.5 mm in diameter, a small stromatoporoid, 8% f-m xyn spar, tr pyrite and chert spherules, 57% f xyn (50 μ m mode) dolomite, 20% interxyn porosity. CL; limpid dolomite lining vugs is non-luminescent, 3% spar filling vugs is bright orange luminescent (a minor amount is non-luminescent). FLUOR; minor zoned dolomite fills fractures. Rock Name: mottled ossicle-rich f xyn dolostone.

BASE OF UNIT 6.10 TOP OF UNIT 24.85 THICKNESS 18.75

UNIT B5. Weathering Character semi-prom. Colour WS lt brownish-grey. FS speckled white

and m grey. Basal Contact trans over 2 cm. Bedding Character indistinct but appears to be planar to sl wavy. Bed/Lam Thickness min 3 cm, max 20 cm, mode 8 cm, intraclast zones occur where lams are indistinct. Composition dolostone, gn/xtal size 0.5 mm, 15% interxyn porosity, intraclasts 25 cm below upper contact are up to 5 mm in size, sbang to sbrd and subequant. There is a faint lineation subparallel to bedding due to minor carb lams. Fossils echinoderm stems near base of unit are intact, trend 65° on bedding planes. Misc very well indurated. B5 Sample/Slab/Thin Section Description (taken of litho and echinoderm stems), fresh surface colour; wk m olive-brown (10YR 5/2) w/ minor wk m olive-brown (10YR 4/2) lams, sedimentary structures; low-amplitude stylolites are accentuated by dk brown film, white and lt brown dolomite has a clotted texture, composition; tr gastropods, brachs and ossicles, shell microstructure is dolomitic, 1% f xyn spar fill fractures and dolospar-lined vugs, 1% bitumen in vugs, clay-sized inclusions in dolomite xtals, 88% m xyn dolomite (125 μ m mode) of 2 types, lt brown and vug-filling dolospar to 200 μ m-sized rhombs and lt brown dolomite w/ clear overgrowths (est 3% clay-sized inclusions), dolomite xtals are intergrown, 10% sample porosity, consists of 5% vugs (to 4 by 1 mm in size and elongate parallel to bedding) and 5% between xtals. CL; generally non-luminescent except for subvertical fracture-filling veinlets (bright orange luminescent overgrowths on spar along fractures). Rock Name: vuggy m xyn dolostone.

BASE OF UNIT 24.85 TOP OF UNIT 25.65 THICKNESS 0.80

UNIT B6. Weathering Character prom. Colour WS and FS banded lt and m brownish grey (mottled in places). Basal Contact trans, planar irregular over 1 sq m exposure. Bedding Character intergraded mottled and planar to wavy lam intervals. Bed/Lam Thickness min 1 cm, max 10 cm, mode 5 cm, carb lams in upper 5 cm are laterally continuous. Composition dolostone. Sedimentary Structures mottles. Fossils poorly preserved brachs, disarticulated, convex-up valves in zone. B6 Sample/Slab/Thin Section Description fresh surface colour; wk olive-brown (10YR 5/2), sedimentary structures; porous mottles, composition; 5% 2 cm-sized smooth disarticulated strophic brachs, 2% f xyn spar, 83% m xyn dolomite rhombs (80 μ m mode) w/ clear rims and inclusion-rich cores, limpid c xyn dolomite lines pores, 10% sample porosity, mottled areas have 15% interxyn porosity. CL; spar in vug has a bright orange luminescent rim where it is surrounded by pore-space in a limpid dolomite-lined vug. The limpid dolomite is non-luminescent. FLUOR; tr orange fluorescent dolomite cores in a vein-filling fracture. Rock Name: mottled brach-bearing m xyn dolostone.

BASE OF UNIT 25.65 TOP OF UNIT 26.05 THICKNESS 0.40

UNIT B7. Weathering Character rec to semi-prom. Colour WS and FS lt grey w/ yellowish-brown patches. Basal Contact abrupt, irregular wavy, (wavelength 6 cm, amplitude 6 mm). Bedding Character tabular cross-stratification. Bed/Lam Thickness min 10 cm, max 45 cm (2 to 3 beds). Composition dolostone, upper 15 cm of unit contains intraclasts, lower half does not, 0.5 mm xtal size, intraclasts are 50% of upper unit, 1 cm long, ang to sbang, elongate subparallel to bedding. Sedimentary Structures lower 0.6 m contains 10 cm thick tabular cross-strata w/ an apparent dip of 10° wrt bedding. Misc bituminous odour, well indurated. B7 Sample/Slab/Thin Section (taken from top of unit), fresh surface colour; overall m olive-brown (10YR 5/3) and minor vw dk olive-brown (10YR 4/1), sedimentary structures; low-amplitude stylolites accentuated by dk brown-residual film, composition; 5% ostracods to 0.8 mm (max dimension), 20% turretelid gastropods (modal length 3 mm) and larger broken gastropod debris, fossils all dolomitic, <1% spar, 65% dolomite, 2 types of m xyn dolomite (125 μ m mode), one white, one lt brown, both w/ inclusion-rich cores, each type concentrated in small patchy areas, lt brown dolomite fills original articulated ostracods, segregation of white and lt brownish dolomite may be related to stylolitization, 10% interxyn porosity. CL; generally non-luminescent dolomite w/ tr orange luminescent overgrowths on dolomite. FLUOR; limpid fracture-filling dolomite is zoned and has fluorescent overgrowths. Rock Name: gastropodal m xyn dolostone.

BASE OF UNIT 26.05 TOP OF UNIT 26.75 THICKNESS 0.70

UNIT B8. Weathering Character prom. Colour WS mottled m grey and yellow-brownish grey.

FS aa, sl less yellowish brown. Basal Contact abrupt, sl wavy (wavelength 10 cm, amplitude 1 cm). Bedding Character massive. Bed Thickness 1 m. Composition dolostone w/ pinpoint porosity, hummocky and convex-up structures 10 cm long by 1 cm high, one has umbrella-shaped vugs at base. Sedimentary Structures stromatolites, tr vugs lined w/ spar. Fossils 3 m abu there are sparse brachs, cup corals, tabular stromatoporoids (one is convex-up, 15 cm long and 1 cm thick) and cephalopods (or gastropods). Misc very well indurated, bitumenous odour. B8 Sample/Slab/Thin Section Description fresh surface colour; mottled wk m olive-brown (10YR 5/2) and vwk dk olive-brown (10YR 4/1), sedimentary structures; low-amplitude but numerous wispy stylolites accentuated by vdk brown residue, composition; 25% articulated ostracods (dolomitic), 2.5 mm modal size, shell microstructure is f xyn dolomite, 2% spar fills limpid dolomite-lined vugs, 1 patch of c xyn spar, tr pyrite as 50µm-sized xtal accumulations to 2.5 mm in size, 1 silicified ostracod valve has relict fibrous structure, some dolomite rhombs also silicified, 58% m xyn dolomite, bimodal, mainly 100 and 200µm-sized (in patchy areas), dolomite has inclusion-rich cores, porosity is 15% (10% interxyn, 5% vugs). CL; vugs are-lined w/ non-luminescent spar, 1% spar filling vugs is zoned and luminesces bright orange. FLUOR; dolomite filling fractures is zoned. Rock Name: ostracodal m xyn dolostone. BASE OF UNIT 26.75 TOP OF UNIT 31.25 THICKNESS 4.50

The contact between member B of the Baillarge Formation and the lower member of the Cape Crauford Formation is taken as the B8/9 contact.

UNIT B9. Weathering Character semi-prom. Colour WS and FS m grey, yellowish-brown surface stain accentuates bedding. Basal Contact abrupt, planar. Bedding Character planar w/ minor cross-lam. Bed/Lam Thickness min 1 cm, max 20 cm, mode 2 cm. Composition calc dolostone, possibly argil, carb lams minor, gn/xtal size 0.2 mm, dk and lt lams, dk lams 2 mm thick, lt lams 1 mm thick. Sedimentary Structures low-angle cross-lam sets approx 1 cm thick. Misc minor kink fold in unit. B9 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2) w/ minor vwk dk olive-brown (10YR 3/1) lams, sedimentary structures; low-amplitude stylolites (0.3 mm amplitude), low-angle cross-lam sets approx 1 cm thick, some lams preferentially dolomitized, composition; vf calcarenite (100µm mode), 64% peloids composed of microspar (in part dolomitic), 30% microspar/f xyn spar 'matrix' (in part dolomitic), 1% bitumen, 30% total m xyn dolomite contains microspar ghosts, therefore dolomite is post-microspar, 5% interxyn sample porosity. CL; dolomite luminesces a uniform dull orange in a non-luminescent peloidal 'groundmass'. Rock name: vf calcarenite; sparry/dolomitic pelmicrosparite. BASE OF UNIT 31.25 TOP OF UNIT 32.55 THICKNESS 1.30

UNIT B10. Weathering Character prom. Colour WS lt to m grey. FS lt grey. Basal Contact abrupt, planar. Bedding Character massive (bed thickness=unit thickness). Composition dolostone. Sedimentary Structures low-amplitude stylolites (?) near the base. Fossils sparse brachs (?). B10 Sample/Slab Description (taken from upper part of unit), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites are accentuated by dk brown films, locally folded (contorted stratification), 21% fossils (3% ossicles, 15% gastropod frags, 2% 3 cm-sized favositid coral frags, 1% brach frags, tr ostracods), 54% f xyn spar, 20% f xyn dolomite (50µm mode) concentrated along stylolites, dolomitic areas are related in part to stylolites, gastropod and ostracods in part dolomitic, dolomite also fills corallites, 5% sample porosity. Rock Name: dolomitic fossiliferous f xyn sparite.

BASE OF UNIT 32.55 TOP OF UNIT 32.75 THICKNESS 0.20

UNIT B11. Weathering Character semi-prom. Colour WS and FS m grey. Basal Contact abrupt, planar. Bedding Character planar in lower 20 cm, trans up to sl hummocky bedding (wavelength 10 cm, amplitude 3 cm). Bed/Lam Thickness min 2.5 cm, max 10 cm, mode 4-5 cm, lams laterally discontinuous, fossiliferous zone is not lam, dk coloured lams more abundant (to 5 mm thick), lt lams are 1 mm thick, possibly cross-lam in places. Composition calc dolostone w/ minor carb lams, numerous intraclasts in the basal 10 cm, 4 cm long, clasts

elongate parallel to bedding, but in places at right angles to bedding. Sedimentary Structures possibly cross-lam. Fossils some randomly oriented brachs in a 10 cm zone 0.6 m abu, very poorly preserved gastropods (5%). B11 Sample/Slab/Thin Section Description (taken from fossiliferous zone below intraclasts), wk dk olive-brown (10YR 4/2), sedimentary structures; vague bedding, composition; 15% intraclasts (2-6 mm in size), 15% gastropod frags, 2% ossicles, one 1.5 mm long stick bryozoan, one sparmicritized(?), dolomitized, and silicified ossicle, 25% peloids (50 μ m mode), 13% microspar, 5% m-c xyn spar, tr bitumen in fractures, tr pyrite, 20% f xyn 30 μ m lt brown dolomite, textural relationships; patches of dolomite related in part to stylolites, some gastropod shells are replaced by m-c xyn white dolomite, articulated ostracod valve is filled w/ white m-c xyn dolostone, 5% interxyn sample porosity. CL; a dolomitized gastropod shell luminesces dull orange. Rock Name: dolomitic/intraclastic/gastropodal biopelmicrosparite.
BASE OF UNIT 32.75 TOP OF UNIT 34.35 THICKNESS 1.60

UNIT B12. Weathering Character prom. Colour WS lt brownish grey (mottled m and lt brownish-grey). FS mottled lt and m grey. Basal Contact abrupt, planar. Bedding Character planar irregular. Bed/Lam Thickness min 15 cm, max 30 cm (3 beds in all). Composition dolostone, carb, possibly bitumenous, gn/xtal size 0.2 mm, 10% interxyn porosity. Sedimentary Structures low-amplitude stylolites. Fossils minor very poorly preserved corals and brachs. B12 Sample/Slab Description (from middle of unit, contains bitumen, well indurated w/ bitumenous odour upon striking), fresh surface colour; mottled wk lt olive-brown (10YR 6/2) and wk m olive-brown (10YR 5/2), sedimentary structures; stylolites, composition; 3% ossicles and 5% favositid corals, a 3 mm c plicate brach and a chain coral, 3% m xyn pore-filling spar, 5% bitumen, 54% m xyn dolomite (75 μ m mode), 30% sample porosity. Rock Name: sl bitumenous m xyn dolostone. B12a Sample/Slab/Thin Section Description (of possible corals), fresh surface colour; mottled wk vlt yellowish-orange (10YR 7/2) and vw dk olive-brown (10YR 4/1), sedimentary structures; low-amplitude stylolites, composition; 10% broken favositid coral frags, 2% ossicles, 1% m-c xyn spar, 3% bitumen, 1% chert, 68% m xyn dolomite, corallite walls are vf xyn dolomite, 15% interxyn sample porosity. CL; 5% bright orange-luminescent overgrowths on non-luminescent dolomite cores. Rock Name: coralline m xyn dolostone.
BASE OF UNIT 34.35 TOP OF UNIT 35.35 THICKNESS 1.00

UNIT B13. Weathering Character semi-rec to rec, isolated outcrop. Colour WS and FS interbedded lt and m brownish-grey. Basal Contact abrupt, very sl wavy, (wavelength 10 cm, amplitude 5 mm.) Bedding Character planar lam. Bed/Lam Thickness min 0.5 mm, max 5 cm, 75% lt coloured 3 mm thick lams. Composition dolostone, gn size 0.2 mm, carb lams, considerable bitumen. Sedimentary Structures low-amplitude stylolites. Misc well indurated, bitumenous odour upon striking. B13 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2) w/ minor vw dk olive-brown (10YR 4/1), sedimentary structures; low-amplitude stylolites accentuated by dk brown bitumenous(?) residue to 75 μ m thick, 1% m xyn subvertical vein-filling fracture and patches of interxyn spar, 3% bitumen, 71% m xyn dolomite, euhedral rhombs w/ inclusion-free overgrowths, 25% interxyn porosity. CL; 1% uniformly distributed bright orange-luminescent dolomite. Rock Name: sl bitumenous m xyn dolostone.
BASE OF UNIT 35.35 TOP OF UNIT 36.05 THICKNESS 0.70

UNIT B14. Rec covered interval.

BASE OF UNIT 36.05 TOP OF UNIT 37.85 THICKNESS 1.80

UNIT B15. Weathering Character semi-prom. Colour WS and FS lt grey. Basal Contact covered. Bedding Character massive. Composition dolostone, gn/xtal size 0.4 mm, 10% irregularly shaped vugs, 3 cm by 1 cm, lined w/ spar, vug long-axes are parallel to bedding, convex-up and may be brach moulds. B15 Sample/Slab/Thin Section Description fresh surface colour; mottled wk vlt yellowish orange (10YR 7/2) and wk m olive-brown (10YR 5/2), sedimentary structures; vugs, composition; 5% 3 cm-sized favositid coral frags (dolomitic), 4%

spar fills pores, 1% as sparry veins filling subvertical fractures, 70% m xyn dolomite (80 μ m mode), minor wispy dolomitic mottles are probably related to stylolites, sample porosity is 20% (10% vugs to 5 mm in size and 10% between xtals). CL; vugs are filled w/ bright orange-luminescent spar overgrowths on non-luminescent cores, otherwise dolomite luminesces dull orange-red. FLUOR; minor fluorescent dolomite rhomb cores in pore-filling dolomite. Rock Name: vuggy fossil-bearing m xyn dolostone.
BASE OF UNIT 37.85 TOP OF UNIT 41.15 THICKNESS 3.30

UNIT B16. Weathering Character semi-rec (2 sq m outcrop). Colour WS lt olive-grey. FS m brownish grey. Basal Contact covered. Bedding Character very sl wavy (wavelength 20 cm, amplitude 3 cm), some breccia pipes from B17 extend down into this unit. Bed/Lam Thickness 20-25 cm, lams extremely faint. Composition calc dolostone, gn/ xtal size 0.2 mm, locally brecciated (20 cm wide pipe bounded by joints), breccia is crackle to mosaic, clast mode approx 4 cm, local minor vugs 2.5 by 2 cm, irregularly-shaped and lined w/ 1 mm-sized spar. Intraclasts are elongate 1 mm by 3.5 cm and subparallel to bedding. An argil layer 1 cm thick occurs in the middle of the unit, and intraclasts were noted in the upper 15 cm. Misc well indurated, slickensides trend 72°, plunge 40°E, slickensided surface occurs just below the breccia. B16 Sample/Slab/Thin Section Description (has weathered slickensides) fresh surface colour; mainly wk lt olive-brown (10YR 6/2), 85% f xyn dolomite (40 μ m mode) includes many corroded rhombs, 15% interxyn sample porosity. CL; uniformly very dull or non-luminescent dolomite. Rock Name: f xyn dolostone.
BASE OF UNIT 41.15 TOP OF UNIT 42.25 THICKNESS 1.10

UNIT B17. Weathering Character prom. Colour WS buff, w/ yellowish brown patches and malachite(?) staining. FS mottled lt brownish grey and m to dk grey. Basal Contact abrupt very irregular. Some breccia extends as pipes into the underlying unit B16. Bedding Character mosaic to rubble breccia. Composition breccia, 50% clasts, calc dolostone, sbang to sbird, randomly oriented, clasts to 20 cm in size. Breccia is 10 m wide, some clasts are lam and have considerable vuggy porosity. Sedimentary Structures subvertical slickensides. Misc extensively fractured.
BASE OF UNIT 42.25 TOP OF UNIT 44.75 THICKNESS 2.50

UNIT B18. Weathering Character semi-prom. Colour WS and FS interbedded lt brownish grey and m brownish grey. Basal Contact abrupt, irregular. Bedding Character planar to wavy/hummocky lams and beds. Bed/Lam Thickness min 2 mm, max 30 cm, mode 6 cm, wavy lams, laterally continuous over at least 1 m. Composition dolostone, dk lams may be carb, gn/xtal size 0.2 mm. Sedimentary Structures hummocky structures. B18 Sample/Slab/Thin Section Description fresh surface colour; overall wk lt olive-brown (10YR 6/2), composition; 1% spar, 79% m xyn dolomite (100 μ m mode), 20% sample porosity (10% interxyn and 10% gypsum(?) xtal moulds, in part dolomitic pseudomorphs or dolomite casts), some swallowtail twin moulds, 1 mm in size. CL; 1% bright orange-luminescent clear calcite(?) in a non-luminescent dolostone. Rock Name: m xyn dolostone.
BASE OF UNIT 44.75 TOP OF UNIT 46.35 THICKNESS 1.60

UNIT B19. Weathering Character semi-prom. Colour WS & FS interbedded m-dk grey (subunit 19a) and yellowish brown (subunit 19b). Basal Contact abrupt, wavy. Bedding Character planar, locally brecciated. Bed/Lam Thickness min 1 cm, max 13 cm, mode 7 cm. Composition 60% subunit 19a-dolomitic ls, microxyn, dk weathering, 40% subunit 19b. Sedimentary Structures high-amplitude stylolites, vugs. B19a Sample/Slab/Thin Section Description (of dk weathering bed), fresh surface colour; vwlt olive-brown (10YR 6/1), sedimentary structures; high-amplitude (1 mm) stylolites, low-angle cross-lam, composition; 88% micrite/microspar, 1% brown residue accentuates stylolites, 2% dispersed spar pseudomorphs after gypsum xtals, 9% porosity (5% gypsum xtal moulds to 3 mm and 4% interxyn porosity). CL; non-luminescent except for a complex pattern (<1%) of subvertical and horizontal spar-filled fracture-filling veinlets (bright orange-luminescent). Rock Name: micritic microsparite. B19b Sample/Slab/Thin Section Description (litho and conodont

sample), fresh surface colour; 10YR 6/2, sedimentary structures; sl fractured, tr stylolites, composition; 87% microspar, 5% f xyn spar lines vugs and cements clasts, tr pyrite and opaque brown mat'l, 8% sample porosity (3% vug/fracture porosity and 5% interxyn porosity). CL; non-luminescent except for dull orange-luminescent veins and vug-filling/lining spar. Rock Name: locally brecciated sl sparry microsparite.
BASE OF UNIT 46.35 TOP OF UNIT 49.35 THICKNESS 3.00

UNIT B20. Weathering Character semi-prom. Colour WS m brownish grey. FS m grey. Basal Contact abrupt, irregular. Bedding Character local rubble breccia. Composition rubble breccia, but differentiation of 'clasts' and 'matrix' is difficult except where clasts are lam, clasts are microxyn ls and randomly oriented. Sedimentary Structures subvertical slickensides. B20 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk lt olive-brown (10YR 6/2), composition; breccia, 5% fracture porosity, also as 15µm thick rims at the boundary between clasts and 'matrix', 40% of breccia clasts are larger than 2 mm in size, elongate, 'clasts' consist mainly of microspar, min size 2 mm, max 10 mm, mode 4 mm, 55% 'matrix' consists of f xyn sparite. CL; 35% bright orange-luminescent rims of coated clasts. Rock Name: f calcirudite-sized breccia; microsparite 'clast' f xyn sparite 'matrix' breccia.

BASE OF UNIT 49.35 TOP OF UNIT 57.25 THICKNESS 7.90

UNIT B21. Weathering Character semi-prom. Colour WS dk grey. FS m to dk grey. Basal Contact abrupt planar. Bedding Character planar, sl hummocky (wavelength 6 cm, amplitude 1 cm), locally deformed (kink fold). Bed/Lam Thickness min 1 cm, max 4 cm, mode 2 cm. Composition dolomitic ls, porous and permeable, 0.2 mm gn/xtal size, faint carb or argil lams, laterally discontinuous. B21 Sample/Slab/Thin Section Description (taken 1 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; planar lams, minor 0.5 mm amplitude stylolites, tr ossicles, 50% peloids (composed of microspar), peloids have a 75µm size mode, range 25-150µm, 45% f xyn spar, 4% brown residue (3% dispersed and 1% along stylolites), one 0.1 mm long conodont w/ approx 15 small 'teeth', 5% sample porosity (2% along and near stylolites and 3% between xtals). CL; non-luminescent except for one small subvertical spar veinlet. Rock Name: pelsparite.

BASE OF UNIT 57.25 TOP OF UNIT 62.25 THICKNESS 5.00

UNIT B22. Weathering Character prom. Colour WS overall buff to lt yellowish brown, irregular surface stain. FS aa, but sl lighter. Basal Contact trans over 20 cm, hummocky (6 to 40 cm wavelength, 1 to 15 cm amplitude, irregular as well). Bedding Character rubble breccia (pipe). Composition breccia clasts (60-70%), matrix (30-40%). Basal 40 cm-clasts are 1 mm to 2 cm long, avg 7-8 mm (poorly sorted), some clasts are dk grey, subequant, randomly oriented, sbang to ang. Within this basal 40 cm zone there is a very uniform inverse grading. Above this zone clast size increases from 1 mm to 15 cm, clasts are very poorly sorted and modal clast size is 1-2 cm. Clast description aa, large sbrd clasts 3 m abu. Sedimentary Structures high-amplitude stylolites. B22 Sample/Slab/Thin Section Description (taken 2 m abu, some clasts are dissolved, resulting in a patchy vuggy porosity), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; many stylolites w/ up to 15 mm amplitude cross-cut breccia clast boundaries and are accentuated w/ an avg 75µm thick dk brown opaque residue that could account for many mm of dissolved mat'l, 30% f to m xyn spar 'matrix', tr chert, 1% f xyn dolomite concentrated adjacent to stylolites, 5% porosity along stylolites, some clasts are dissolved or partly dissolved, 10% interxyn porosity, there are 54% breccia clasts are larger than 2 mm, randomly oriented, composed of microsparite/sparite, breccia clasts range from 2 to 20 mm in size, w/ a mode of 8 mm. CL; 40% moderate orange-luminescent 'matrix' between clasts. Residue along stylolites is non-luminescent. Rock Name: m calcirudite-sized breccia; microsparite/f xyn sparite clast rubble breccia. B22a Sample/Slab/Thin Section Description (consists of large white 30 cm-sized clasts 27 m abu. Breccia also occurs on the other side of the stream), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; vaguely bedded, 42% microspar, 1% brown opaques, tr pyrite, 52% f xyn dolomite (60µm mode as dispersed

rhombs), there are microspar ghosts, therefore dolomite is post-microspar, 5% interxyn sample porosity. CL; non-luminescent. Rock Name: microsparitic f xyn dolostone. Section B was terminated here because the rest of the section was too steep and is probably a breccia pipe to the top of the cliff.

BASE OF UNIT 62.25 TOP OF UNIT 101.25 THICKNESS 39.00

C. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION C, MEASURED IN 1982.

Locality: North central Jackson Inlet.

Latitude: 73°18'12"N.

Longitude: 88°42'50"W.

This section starts about 5.1 km west of section A and east of section B.

UNIT C1. Weathering Character prom. Colour WS mottled m grey and yellow brownish grey. FS aa but generally sl darker. Basal Contact covered. Bedding Character planar irregular w/ irregular surface following mottle pattern and hummocky structures. Bed/Lam Thickness min 14 cm, max 2 m. Composition dolostone, irregular dk carb patches, mottles about 3 cm in size, some mottle long axes are parallel to bedding, gn/xtal size 0.3 mm in the middle of unit. Fossils abundant but poorly preserved, colonial corals, sparse brachs and cup corals throughout. A 20 cm thick fossil zone occurs 5 m abu. Brachs (5%) are randomly oriented, cup coral (1%) is on its side, favositid corals and ossicles. C1 Sample/Slab/Thin Section Description (taken from the middle of the unit), fresh surface colour; mottled, overall wk lt olive-brown (10YR 6/2), sedimentary structures; stylolites, composition; fossils dolomitic, consist of 10% ossicles w/ dolomitic syntaxial overgrowths, 5% favositid coral (20 mm in size), 1% *Catenipora*, the corallite microstructure is vf xyn dolomite, 1 cup coral (11 mm high), 1% m xyn spar, 3% brown opaque clay-sized inclusions in dolomite xtals, (80% are m xyn w/ a 125 μ m mode), dolomite rhombs have clear rims and inclusion-rich cores, 20% sample porosity (mainly interxyn although central corallites of favositid coral have 40% porosity). CL; 2% bright orange-luminescent calcite overgrowths on non-luminescent spar cores. The rest of the sample is non-luminescent dolomite. FLUOR; multi-fold zoned vug-filling spar. Rock Name: fossiliferous m xyn dolostone. Sample C1a taken of poorly preserved coral from talus.

BASE OF UNIT 0.00 TOP OF UNIT 9.00 THICKNESS 9.00

UNIT C2. Weathering Character semi-prom. Colour WS m yellowish brown limonitic stains, lt brownish grey, banded lt and dk. FS m brownish grey w/ dk grey lams. Basal Contact trans over 5 cm, planar. Bedding Character planar irregular to sl wavy. Bed/Lam Thickness min 2 cm, max 13 cm, mode 7 cm, lams widely spaced (1 cm), dk grey (1 mm) lams, carb, continuous laterally over at least 30 cm, irregularly-shaped. Composition dolostone, gn/xtal size 0.3 mm, 10% interxyn porosity, rd intraclasts occur near top of unit in a zone 3 cm thick, comprises 30% in cross-section, 2% carb lams. Limonitic(?) staining on weathering surface, 2% on joint faces, possibly pyrite weathering, carb lams comprise 2%. Sedimentary Structures intraclasts, some of the wavy bedding may be ripple marks. Fossils sparse brachs occur in the upper 10 cm of unit, all convex-up, some articulated, generally poorly preserved. C2 Sample/Slab/Thin Section Description (taken from middle of unit). fresh surface colour; wk lt olive-brown (10YR 6/2) w/ minor vwkd olive-brown (10YR 2/1) lams, sedimentary structures; low-amplitude stylolites, misc; fractures lined w/ m xyn limpid dolomite, bitumen fills center, composition; 15% articulated ostracod ghosts (dolomitic), 1% c xyn spar fills limpid dolomite-lined vugs, 1% bitumen fills fractures, 3% brown clay-sized inclusions occur in dolomite rhombs, there is 68% m xyn dolomite (75 μ m mode) which has brown inclusion-rich cores and clear inclusion-free rims, 15% interxyn porosity. CL; <1% bright orange-luminescent calcite, dolomite luminesces dull red. FLUOR; multifold zonation of vug-filling spar. Rock Name: mottled ostracodal f-m xyn dolostone. C2a Sample Description (taken from upper 10 cm of unit), contains strophic f costate brachs to 20 mm wide).

BASE OF UNIT 9.00 TOP OF UNIT 9.70 THICKNESS 0.70

UNIT C3. Weathering Character semi-prom. Colour WS lt brownish grey w/ yellowish brown staining on joint surfaces. FS lt brownish grey. Basal Contact abrupt, very sl wavy (wavelength 1.5 m, amplitude 5 cm). Bedding Character massive. Composition dolostone, gn/xtal size 0.4 mm. C3 Sample/Slab/Thin Section Description (taken from upper half of unit), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; discontinuous wispy stylolites, composition; 5% spar fills interxyn pores, vugs, and fractures, 1% bitumen, 2% clay-sized inclusions in dolomite. Total dolomite content is 74%, dolomite is m xyn (100 μ m mode) and has inclusion-rich cores and clear rims, although in some rhombs there are multiple inclusion-rich and poor zones, 20% interxyn and fracture porosity, interxyn porosity is higher around fractures. CL; 10% bright orange-luminescent calcite overgrowths on non-luminescent calcite cores. Dolomite is non-luminescent and calcite is distributed along veinlets and in porous areas between dolomite xtals. FLUOR; tr zoned dolomite. Rock Name: sl sparry m xyn dolostone.

BASE OF UNIT 9.70 TOP OF UNIT 10.00 THICKNESS 0.30

UNIT C4. Weathering Character prom. Colour WS mottled m grey and yellow brownish grey. FS aa but sl darker. Basal Contact abrupt, very sl wavy (wavelength 16 cm, amplitude 1 cm). A carb zone 1 cm thick occurs between C3 and C4. In places this zone is trans between the two units. Bedding Character mottled. Composition dolostone, dk mottles about 3 cm in size. Fossils only sparse poorly preserved corals.

BASE OF UNIT 10.00 TOP OF UNIT 13.50 THICKNESS 3.50

The contact between the Baillarge and Cape Crauford formations is taken as the boundary between units C4 and C5.

UNIT C5. Weathering Character semi-prom. Colour WS m brownish grey w/ yellowish brown surface staining. FS m brownish grey w/ irregular fine <1 mm dk grey streaks. Basal Contact abrupt, wavy. Bedding Character crenulated lams follow bedding. Bed/Lam Thickness min 1 cm, max 20 cm, mode 8 cm, beds pass from dominantly planar in lower 5 cm up into crenulated carb lams (in 3-dimensions), wavelength 12 cm, amplitude 3 cm. Composition dolostone, very sl carb. Fossils orthocones, randomly oriented on bedding planes, one is dolomitized, 18 mm long and 3 mm wide. C5 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; sl wavy lam, 1% spar between dolomite rhombs, 10% interxyn bitumen, 74% m xyn dolomite (75 μ m mode) w/ clear rims and inclusion-rich cores, 15% interxyn porosity. CL; uniform very dull red luminescent dolomite, interxyn spar luminesces bright orange. Rock Name: bitumenous m xyn dolostone.

BASE OF UNIT 13.50 TOP OF UNIT 14.90 THICKNESS 1.40

UNIT C6. Weathering Character semi-prom. Colour WS mottled white and m brownish grey breccia. FS m to dk brownish grey. Basal Contact trans over 5 cm, irregular. Bedding Character planar where unbrecciated. Some beds broken w/ dolomite xals to 1 mm separating beds. The uppermost metre is deformed into tepee-like structures. Bed/Lam Thickness min 1 cm, max 5 cm, mode 3 cm. Composition dolostone comprises clasts (all of the same litho), very minor brecciation within bed, gn/xtal size 0.5 mm, 'matrix' is calcite (bladed variety com), poorly preserved corals 10 cm by 2.5 cm high, in growth position, C6 Sample/Slab/Thin Section Description (taken 1 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), composition; 1% spar fills dolomite-lined pores between clasts, dolomite between clasts is extremely c xyn (to 5 mm in size), dolomite in clasts has inclusion-rich cores and clear rims, 5% interxyn porosity, 60% breccia clasts larger than 2 mm in size, 10 cm max size, 2.5 cm modal clast size, clasts composed of m xyn dolostone w/ 2% brown opaque clay-sized inclusions. CL; breccia clasts luminesce very dull red and dolomite cement is non-luminescent. Tr bright orange-luminescent calcite overgrowths on non-luminescent cores. Rock Name: m xyn dolostone, locally c calcirudite-sized mosaic

breccia (extremely c xyn dolomite cement).

BASE OF UNIT 14.90 TOP OF UNIT 17.40 THICKNESS 2.50

UNIT C7. Weathering Character prom. Colour WS buff to m brownish grey stain. FS lt brownish grey. Basal Contact trans irregular. Bedding Character massive. Bed Thickness unit changes thickness laterally. Composition microxyn ls. Sedimentary Structures minor high-amplitude stylolites. Misc note that to date all ls has been dolomitized except for the f xyn ls. This may signify a permeability control to dolomitization. The unit is brecciated and changes thickness laterally. C7 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), composition; 28% microspar, 65% f & m xyn spar, 2% interxyn brown opaque mat'l, 5% interxyn porosity, especially high near fractures. CL; 20% bright orange-luminescent spar overgrowths on non-luminescent cores. Rock Name: microsparitic f-c xyn sparite. Sample C7 taken for conodonts.

BASE OF UNIT 17.40 TOP OF UNIT 17.70 THICKNESS 0.30

UNIT C8. Weathering Character semi-prom. Colour WS m brownish grey. FS dk brownish grey. Basal Contact abrupt, wavy and deformed. Bedding Character planar, locally brecciated. Bed/Lam Thickness min 4 mm, max 2 cm, mode 1 cm, lams are paper thin, carb, lateral extent indet due to deformation. Composition ls w/ 5% carb mat'l. C8 Sample/Slab Description (unoriented due to friable nature), fresh surface colour; wk lt olive-brown (2.5Y 6/2), sedimentary structures; shiny dk brown slickensided surface, composition; breccia, 80% of the clasts are larger than 2 mm, 50% of clasts consist of microsparite and 30% consist of vf xyn dolostone, min clast size 2 mm, max 6 mm, 5% porosity, 15% m xyn sparite 'matrix'. Rock Name: f-m calcirudite-sized breccia; microsparite to vf xyn dolostone 'clast' m xyn sparite 'matrix' rubble breccia.

BASE OF UNIT 17.70 TOP OF UNIT 18.00 THICKNESS 0.30

UNIT C9. Weathering Character semi-prom (1 square m exposure). Colour WS buff to m brownish grey surface stain, FS m brownish grey. Basal Contact abrupt, wavy due to deformation. Bedding Character massive, locally brecciated. Bed Thickness indet due to its highly fractured nature. Composition microxyn ls.

BASE OF UNIT 18.00 TOP OF UNIT 18.50 THICKNESS 0.50

UNIT C10. Weathering Character rec covered interval.

BASE OF UNIT 18.50 TOP OF UNIT 19.00 THICKNESS 0.50

UNIT C11. Weathering Character semi-prom. Colour WS lt to m grey w/ yellowish brown irregular patches. FS lt brownish grey. Basal Contact covered. Bedding Character massive. Composition dolostone, porous and permeable, gn/xtal size <0.05 mm. Sedimentary Structures high-amplitude stylolites, some fractures lined w/ dolomite. C11 Sample/Slab/Thin Section Description (taken just below upper contact), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; bedding, minor stylolites, 5% m xyn dolomitic veinlets, composition; vf xyn dolomite w/ 10% interxyn porosity, dolomite is pseudomorphic after gypsum xtals to 3 mm long, mat'l between pseudomorphs is vf xyn dolomite (89%), 1% pyrite. CL; dull red luminescent dolomite except for non-luminescent dolomite veinlets, one stylolite is moderately orange luminescent. Rock Name: interbedded vf xyn dolostone and dolomitic microsparite.

BASE OF UNIT 19.00 TOP OF UNIT 19.70 THICKNESS 0.70

UNIT C12. Weathering Character prom 4 m-wide outcrop. Colour WS lt to m grey w/ yellowish-brown irregular patches. FS m grey. Basal Contact abrupt, wavy (wavelength 1 m, amplitude 2 to 5 cm). Bedding Character wavy (wavelength 4 cm, amplitude 5 mm). Bed/Lam Thickness min 1 cm, max 25 cm. Composition microxyn fossiliferous calc dolostone. Fossils 1-2% poorly preserved brachs. Misc dolomite veinlets 2-3 mm thick throughout unit. C12 Sample/Slab/Thin Section Description (taken at base of unit), fresh surface colour; lt olive-brown (10YR 6/3), 2% ossicles, 3% spar between dolomite rhombs, 1% interxyn

bitumen, 2% brown opaque inclusions in dolomite rhombs, 91% m xyn (150 μ m mode) dolomite has inclusion-rich cores and clear rims, 3% interxyn sample porosity. CL; dull red luminescent inclusion-rich dolomite cores. Clear dolomite overgrowths are non-luminescent, tr bright orange luminescent subvertical veinlets. Rock Name: ossicle-bearing sl sparry m xyn dolostone.

BASE OF UNIT 19.70 TOP OF UNIT 20.70 THICKNESS 1.00

UNIT C13. Weathering Character prom. Colour WS interbedded dk grey and yellow-brownish grey (5 mm thick beds), yellowish brown to orangy staining on surface. FS dk grey. Basal Contact trans over 10 cm, planar. Bedding Character very wavy irregular, lensoidal. Bed/Lam Thickness min 2 cm, max 20 cm, mode 10 cm. Composition microxyn calc dolostone w/ high carb content, lams <1 mm to 1 cm thick, dk grey lams to 5 mm thick, good parting, therefore possibly argil. Sedimentary Structures lensoidal lumps, bedding of depositional origin, C13 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; interlam wk vdk olive-brown (10YR 3/2) and wk xdk olive-brown (10YR 2/2), sedimentary structures; wavy lam, composition; 35% intraclasts, 29% microspar, 3% dispersed aphanoxyn to vf xyn dolomite, 3% carb film, 25% f xyn dolomite, 5% fracture/interxyn/stylolite porosity. CL; very dull red luminescent dolomite, calcite is non-luminescent. FLUOR; brown fluorescent residue along stylolites. Rock Name: m calcarenite (clastic): dolomitic (f xyn) intrasparite.

BASE OF UNIT 20.70 TOP OF UNIT 21.70 THICKNESS 1.00

UNIT C14. Weathering Character semi-prom. Colour WS buff w/ yellowish brown irregular staining. FS lt brownish grey. Basal Contact abrupt, wavy (5 cm wavelength and 5 mm to 1 cm amplitude). Bedding Character faint, accentuated by lt and dk beds and by white dolomite filling vugs, almost a lumpy type of bedding. Bed Thickness min 6 cm, max 17 cm, mode 10 cm, faint lams. Composition dolostone, 0.3 mm gn/xtal size, tr vugs of brach moulds. Fossils very poorly preserved articulated dolomitic brachs to 2 cm in size. C14 Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), composition; 5% orthocones and brach frags, 25% spar, 1% interxyn bitumen, tr pyrite, 69% m xyn dolomite (40 μ m mode) has clear rims and inclusion-rich cores, 15% interxyn porosity. CL; 2% bright orange-luminescent dolomite overgrowths on non-luminescent dolomite cores. FLUOR; 60% vug-filling zoned spar. Rock Name: fossil-bearing sparry f xyn dolostone.

BASE OF UNIT 21.70 TOP OF UNIT 22.60 THICKNESS 0.90

UNIT C15. Weathering Character semi-prom. Colour WS m grey w/ yellowish brown surface stains. FS m brownish grey. Basal Contact trans over 10 cm, wavy (wavelength 5 cm, amplitude 5 mm). Bedding Character wavy in 3 dimensions, (wavelength 5 cm, amplitude 5 mm). Bed/Lam Thickness min 5 mm, max 2 cm, mode 1 cm. Composition dolomitic ls, probably argil, carb films. C15 Sample/Slab/Thin Section Description fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; vague bedding, 50% rd intraclasts composed of microspar, 1 articulated ostracod to 250 μ m in size, 50% vf xyn spar, tr bitumen fills subvertical fractures, 1% pyrite, 20% f-m xyn dolomite (50 μ m mode) in zones that follow some lams, dolomite rhombs have clear rims and inclusion-rich cores, 3% fracture/interxyn porosity. CL; 15% bright orange-luminescent calcite overgrowths on non-luminescent spar cores exclusively in peloids. Dolomite between peloids is non-luminescent. Rock Name: vf-f calcarenite: dolomitic intrasparite.

BASE OF UNIT 22.60 TOP OF UNIT 22.80 THICKNESS 0.20

UNIT C16. An interbedded unit. Subunits C16a and C16b become more similar higher in the unit. Weathering Character prom. Colour WS interbedded m brownish grey and dk grey, former predominates, yellowish brown staining on surfaces. FS m brownish grey w/ dk grey. Basal Contact abrupt, wavy in 3-dimensions, (wavelength 4 cm, amplitude 5 mm). Bedding Character planar. Bed/Lam Thickness min 1 cm, max 40 cm, mode 10 cm, comprises 10% of sequence as a whole, other units faintly lam. Composition calc dolostone, chert nodule zone 6 m abu. Sedimentary Structures high-amplitude stylolites 6 m abu. C16a Sample/Slab/Thin

Section Description (taken from lower m of unit, thick m brownish grey units), fresh surface colour; lt olive-brown (10YR 6/3) sedimentary structures; vague bedding, m xyn spar veinlet, 3% inclusions, 82% m xyn spar-cemented dolostone (100 μ m mode), dolospar veinlet becomes a m xyn spar veinlet when it crosses a major stylolite, dolomite has clear rims and inclusion-rich cores, 15% interxyn porosity, is higher near stylolites. CL; non-luminescent. Rock Name: m xyn dolostone. C16b Sample/Slab/Thin Section Description (taken from lower m of unit, dk, lam and thinner bedded, dolomitic ls, comprises 45% of unit, fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; vague planar bedding, low amplitude stylolites, composition; microspar and f xyn spar (66%), 1% opaques along stylolites, 30% f xyn dolomite, 3% porosity along stylolites as well as interxyn porosity. CL; dull orange-luminescent dolomite, calcite is non-luminescent. Rock Name: dolomitic (f xyn) microsparite/f xyn sparite. C16c Sample/Slab Description (taken 6 m abu, contains fractured grey chert nodules), fresh surface colour; dk grey, sedimentary structures; papery parting along dk grey laterally continuous carb films, 66% microspar, 4% carb films, 25% vf xyn dolomite, 5% porosity between xtals and along stylolites. Rock Name: dolomitic (f xyn) microsparite.

BASE OF UNIT 22.80 TOP OF UNIT 29.60 THICKNESS 6.80

UNIT C17. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt planar. Bedding Character crackle to mosaic breccia; 10 cm clast size mode. Composition calc dolostone breccia, (<0.1 mm xtal size, greenish clay-sized mat'l in vugs). Sedimentary Structures high-amplitude stylolites. C17 Sample/Slab/Thin Section Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; high-amplitude stylolites, composition; 10% interclast/fracture/stylolite porosity and 5% interxyn porosity, 45% breccia clasts larger than 2 mm, many clast boundaries are stylolites, min clast size 2 mm, max 25 mm, mode 11 mm, both 'clasts' and 'matrix' consist of 45% microspar and 45% f xyn spar (as clotted texture in both 'clasts' and 'matrix'). CL; tr bright orange-luminescent subvertical fractures. Rock Name: m calcirudite-sized breccia; stylolitic microsparite 'clast/matrix' breccia. C17a Sample/Slab/Thin Section Description (rep of main litho), contains orange-brown and yellow-green staining in and around vugs, fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; high-amplitude (to 15 mm) stylolites w/ considerable insoluble residue on seams that averages 400 μ m in thickness, composition; 24% microspar, 50% f xyn spar, 1% opaques, <1% c xyn dolomite near stylolites, 25% sample porosity consists of 15% interclast/stylolite porosity and 10% interxyn porosity. 'Clasts' and 'matrix' are difficult to distinguish. CL; irregularly-shaped dull orange-luminescent calc areas. Rock Name: vuggy microsparitic f xyn sparite crackle (stylo-) breccia. Sample C17b (taken of greenish clay-sized calc mat'l in and around vugs and staining breccia clasts). BASE OF UNIT 29.60 TOP OF UNIT 32.10 THICKNESS 2.50

UNIT C18. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact abrupt, convex-up structures. Bedding Character lam. Bed/Lam Thickness mm thick lams. Composition microxyn calc dolostone. Sedimentary Structures high-amplitude stylolites and convex-up structures (3 cm wide and 3 cm high) at the base of the unit, also planar to sl wavy lam. Fossils large cup corals, 25% ossicles, various sizes w/ star-shaped axial canals, stromatoporoids and an orthoconic nautiloid, this fossiliferous zone is 0.75 m abu and contains abundant transported well-preserved fossils. C18 Sample/Slab Description (taken 0.75 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; vaguely bedded, high-amplitude (to 2 mm) stylolites, 23% fossils, consist of 10% ossicles, 4% solitary corals (2 cm in diameter and 3 cm high), one appears to have grown inside another solitary coral, 5% favositid corals, 4% tabular stromatoporoids, 59% microspar, 5% spar, 1% chert, 12% dolomite (of 2 types). The first type occurs along and near stylolites, is lt brown and m xyn (50 μ m mode). The second type is white c xyn dolomite. Porosity (fracture and interxyn) is 5%. Rock Name: dolomitic/sl sparry biomicrosparite. C18a Sample/Slab Description (taken just above the basal contact), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; wavy and convex-up structures, 79% microspar, 1% bitumen 15% m xyn dolomite (mode 70 μ m) is concentrated and defines wavy and convex-up lams, 5%

fracture/interxyn porosity. Rock Name: dolomitic microsparite. C18b Sample Description (of an orthoconic nautiloid), fresh surface colour; m olive-brown (10YR 5/3). C18c Sample/Slab Description (unoriented), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low-amplitude stylolites, misc; minor fractures, composition; 15% rd-intraclasts (mode 5 mm) consist of microspar, 5% solitary corals to 2 cm in diameter, 1% colonial corals, 10% ossicles (1 is 11 mm in diameter), also 1 stem (8 mm long) and 1 small orthocone, 44% microspar, 5% spar fills dolomite-lined vugs, tr chert occurs as small spherules to 100 μ m in diameter, total dolomite content is 15% and consists of 5% lt brown f xyn dolomite along stylolites and 10% white dolomite (100 μ m mode), 5% fracture and interxyn porosity. Rock Name: dolomitic/intraclastic/sl sparry biomicrosparite. C18d Sample/Slab/Thin Section Description fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low-amplitude stylolites, composition; 10% intraclasts, 25% ossicles, 20% colonial corals, 15% microspar, 10% spar fills corallites, tr chert, 15% f xyn dolomite (50 μ m mode), 5% interxyn porosity. CL; non-luminescent except for bright orange-luminescent spar veinlets and large dull-luminescent dolomite xtals. FLUOR; zonation is com in spar filling corallites. Rock Name: dolomitic (f xyn) and sparry intraclastic biomicrosparite.
BASE OF UNIT 32.10 TOP OF UNIT 36.60 THICKNESS 4.50

UNIT C19. Weathering Character prom, an interbedded unit. Colour WS buff and m grey. FS m grey. Basal Contact trans. Bedding Character 50% thin beds, 50% thick beds, locally brecciated. Thin bedded unit has irregular lams, 5-10% carb mat'l. The interbedded nature is almost lost in the upper 2 m of the unit where it becomes thin-bedded throughout. Bed Thickness thinner beds range from 6 to 40 cm in thickness, the thicker beds have a 30 cm modal thickness. There are a total of 8 of the thin-bedded units. Composition calc dolostone. Sedimentary Structures tool or rough-like marks occur on bedding surfaces. Misc the stream cuts down along the axis of a minor syncline. C19 Sample/Slab/Thin Section Description (from the thinner bedded unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, composition; 40% intraclasts, 2% fossils, consist of 1 ostracod 4.5 mm across (valve is 75 μ m thick), 1 small gastropod and 2 ossicles, 20% peloids (composed of 15% microspar and 10% micrite), 20% f xyn spar, 1% bitumen, 7% dolomite (50 μ m modal size). CL; non-luminescent. FLUOR; geopetal spar filling ostracod is zoned. Rock Name: sl dolomitic peloidal intrasparite. C19a Sample/Slab/Thin Section Description (from the thicker bedded unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude wispy stylolites, irregular lumpy bedding, composition; 20% ostracods and ostracod frags <0.5 mm, both articulated and disarticulated, 44% peloids (composed of microspar), 5% fracture-fill, 20% microspar, 1% bitumen, tr pyrite, 5% vf xyn dolomite, 5% porosity mainly along stylolites. CL; non-luminescent w/ the exception of tr subvertical bright orange-luminescent veinlets. FLUOR; tr fluorescent xtals inside ostracod. Rock Name: sl sparry ostracodal biopelmicrosparite.
BASE OF UNIT 36.60 TOP OF UNIT 41.90 THICKNESS 5.30

UNIT C20. (moved from west to east side of stream). Weathering Character semi-prom. Colour WS buff, dk and lt beds. FS overall lighter. Basal Contact abrupt, convex-up structures. Bedding Character massive, planar and laterally continuous over 1 m, lams from 1 to 4 mm thick. Composition calc dolostone, lower half of unit is c xyn w/ dolomite rhombs ranging to 0.7 mm (0.5 mm mode), minor carb flakes to 5 mm long and less than 1 mm thick, gn/xtal size is 0.2 mm in the upper half of the unit, locally brecciated (4 cm modal clast size). Sedimentary Structures local breccia, C20 Sample Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; planar lams, misc; porous and permeable, fractures, vugs to 400 μ m in size, composition; 20% spar, tr pyrite along fractures, 50% f xyn dolomite, some calcified dolomite, 30% porosity as vugs and between xtals but also along fractures, some vugs are filled w/ bitumen). CL; dull orange-luminescent spar. Rock Name: sparry f xyn dolostone.
BASE OF UNIT 41.90 TOP OF UNIT 42.10 THICKNESS 0.20

UNIT C21. Weathering Character prom, cavernous weathering at base of C21. Colour WS lt

grey to buff. FS aa but sl darker. Basal Contact abrupt, planar irregular. Bedding Character trans upward from rubble breccia to mosaic to crackle breccia and finally to unbrecciated strata of unit C22. Composition clast-supported breccia, 30% calc 'matrix', 70% calc dolostone 'clasts', modal clast size approx 2 cm, varies from 2 to 40 mm, poorly sorted, clast size generally uniform throughout (i.e., no large clasts), clasts ang to sbrd. Four m abu breccia is sl better sorted, occasional large clasts to 11 cm, 5% of clasts have calc lams, clasts rotated. This breccia is definitely of the bedded variety because it can be traced for many km along the inlet. C21 Sample/Slab/Thin Section Description (taken from base of unit), fresh surface colour; overall lt olive-brown (10YR 6/3), sedimentary structures; very high amplitude stylolites accentuated w/ up to 300 μ m thick dk grey residue, 1% vf and f xyn-pyrite, 3% m-c xyn dolomite, 5% interclast porosity, 5% interxyn porosity, m xyn spar lines vugs, 60% of the breccia clasts consist of microspar and clotted microspar and f xyn spar, min clast size 2 mm, max 16 mm, mode 7 mm. CL; 2% bright-blue luminescent fluorite after dolomite, 5% bright orange-luminescent overgrowths on non-luminescent calcite cores. Rock Name: m calcirudite-sized breccia; stylolitic microsparitic/f xyn sparite breccia. Sample C21a contains a small orthocone, taken 0.5 m abu. Sample C21b (unoriented) taken from upper part of breccia within the trans zone.

BASE OF UNIT 42.10 TOP OF UNIT 62.90 THICKNESS 21.00

UNIT C22. Weathering Character prom. Colour WS m brownish grey. FS m grey. Basal Contact trans over at least 10 cm, highly irregular, degree of brecciation decreases across trans zone. Bedding Character planar irregular. Bed/Lam Thickness <1 cm to 9 cm, mode 5 cm, bed thickness in upper part of unit is about 2 cm. Composition microxyn ls, peloids form approx 50% of rock, are concentrated in beds 1 cm thick and are separated by sparsely peloidal zones. The peloidal litho is not seen in the underlying breccia. Dk grey chert beds are spaced 4 to 10 cm apart, are 2 cm thick and occur in the upper 2 m of the unit, peloid concentration decreases up toward the chert bed zone. Sedimentary Structures chert nodule-rich lams in upper part of unit. C22 Sample/Thin Section Description (rep litho sample), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites (160 μ m max amplitude), misc; minor subvertical fractures, composition; 15% articulated ostracods to 1.2 mm in size, 72% microspar, 5% clear f-m xyn spar fills veinlets and pores, length-slow fibrous chalcedony nodules to 5 mm in size, 1% dk brown residue along stylolites, 2% dispersed dk brown insoluble mat'l, misc; stylolites drape around fibrous chalcedony nodules, 5% vf xyn dolomite, 5% interxyn porosity. CL; very dull green luminescent chert, very dull orange-luminescent calcite w/ the exception of one subvertical (calcite?) veinlet which has bright orange-luminescent overgrowths. FLUOR; lt brown fluorescent irregularly-shaped patches. Rock Name: sl dolomitic and chalcedonic ostracodal biomicrosparite. Sample C22 taken for conodonts.

BASE OF UNIT 62.90 TOP OF UNIT 65.50 THICKNESS 2.60

UNIT C23. Weathering Character semi-rec. Colour WS m brownish grey to buff. FS m brownish grey. Basal Contact abrupt, overall planar, irregular on a cm scale. Bedding Character crackle breccia. Composition clast-supported ls breccia, 'clasts' and 'matrix' are ls, clasts unlam, micritic, up to 5 cm in size, poorly sorted, mode approx 3 cm, high matrix porosity. Sedimentary Structures high-amplitude stylolites. C23 Sample/Slab/Thin Section Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; high-amplitude stylolites are accentuated by 50 μ m thick dk grey residue, 5% f-m xyn dolomite, minor c xyn quartz adjacent to stylolites, 2% porosity between clasts and along stylolites and 3% interxyn porosity, 70% breccia clasts composed of microsparite, pelmicrosparite and pelsparite, 2 mm min size, 30 mm max size, 13 mm modal size. CL; minor moderately blue-luminescent fluorite after dolomite especially along stylolites, some of the larger xtals are zoned. Calcite is generally very dull orange luminescent but there are about 2% bright orange luminescent calcite overgrowths along veinlets. FLUOR; brown mat'l fluoresces yellow. Rock Name: sl dolomitic (f-m xyn) microsparite/f xyn sparite crackle breccia.

BASE OF UNIT 65.50 TOP OF UNIT 65.65 THICKNESS 0.15

UNIT C24. Weathering Character semi-prom. Colour WS and FS lt buff to white. Basal Contact brecciated, very irregular. Bedding Character planar bedded, faint planar lams, locally brecciated (including breccia pipes). Bed/Lam Thickness min 1 cm, max 15 cm, mode 5 cm. Composition very soft dolostone. C24 Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; low-angle cross-lams, misc; porous and permeable, 15% f-m xyn spar, 60% vf and f xyn dolomite, 25% interxyn and mouldic porosity. CL; 1% bright blue luminescent calcite, dolomite luminesces a dull orange but there are bright orange-luminescent overgrowths (1%). Rock Name: vuggy sparry vf and f xyn dolostone. C24a Sample/Slab/Thin Section Description (taken at the C24/25 contact), fresh surface colour; 80% breccia 'clasts' are wk vlt yellowish-orange (10YR 7/2) and 'matrix' is vwk lt olive-brown (10YR 6/1), misc; fractures, f xyn dolomite has clear rims w/ cores replaced by clear spar. Near fractures the spar has been removed. Sample porosity is 20% and consists of fracture and interxyn porosity and 10% as rhomb-shaped xtal moulds to 50 μ m-these were formed by calcification of dolomite cores followed by spar removal. CL; calcite generally luminesces dull orange, dolomite (w/ the exception of 2% blue-luminescent fluorite after-dolomite) is mainly non-luminescent, tr scattered bright orange-luminescent overgrowths also occur on calcite. Rock Name: microsparitic vf xyn dolostone crackle breccia. BASE OF UNIT 65.65 TOP OF UNIT 66.40 THICKNESS 0.75

UNIT C25. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact brecciated, very irregular. Bedding Character planar, basal half of unit is sl wavy and locally brecciated. Bed/Lam Thickness min 4 cm, max 80 cm. Composition dolomitic ls, locally brecciated, includes 45° angle pipe. Fossils 15% ossicles, corals, bun-shaped stromatoporoids, unoriented in a continuous zone, <1% brachs and gastropods. A stromatolitic zone occurs 0.8 m abv, above this is the more fossiliferous mat'l. C25 Sample Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; stylolites w/ up to 2 mm amplitude, composition; 9% intraclasts composed of microspar, 50% bun-shaped stromatoporoids (6 cm wide and 5 cm high), 1% bryozoans, 5% ossicles, 5% colonial coral, some walls are composed of dolomite, 5% vf-m xyn dolomite, 5% interxyn porosity, 20% microspar. Rock Name: sl dolomitic intraclastic stromatoporoidal biomicrosparite. C25a Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, misc; 1% subvertical spar veinlets, composition; 1 small colonial coral frag 1 cm in size, 5% stromatoporoids, 2% brach frags (one 100 μ m thick plicated valve), 9% ossicles and 1 echinoderm plate, <1% ostracods, 15% peloids (50 μ m size mode), 20% micrite, 33% microspar and 5% spar as veinlets and pore-filling in corals and stromatoporoids, tr vf xyn disseminated pyrite, 5% f-m xyn dolomite, most along stylolites, 5% sample porosity (2% along stylolites and 3% between xtals in a zone near stylolites). CL; 5% bright blue luminescent fluorite after dolomite, some of which is zoned. Calcite is dull orange luminescent except for one bright orange luminescent ossicle. FLUOR; zoned spar filling corallites is com. Rock Name: sl dolomitic/micritic biopelmicrosparite. C25b Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; minor but high-amplitude (to 4 mm) stylolites are accentuated by vdk grey residue to 40 μ m thick, composition; 10% poorly preserved gastropods to 3 cm in size, 30% ostracods all 1 mm or less in size, tr ossicles, 15% peloids (40 μ m mode, range 25-75 μ m), 12% microspar, 20% f-m xyn spar, 5% f xyn dolomite, 8% sample porosity (3% in fractures and along stylolites, 5% between xtals). CL; non-luminescent except for tr bright orange-luminescent subvertical veinlets. FLUOR; zoned vug-filling spar is com. Rock Name: sl dolomitic/microsparitic ostracodal biopelsparite. C25c Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; high-amplitude (to 5 mm) stylolites accentuated w/ 25 μ m thick dk grey residue, misc; small sample, composition; 15% fossils (5% ossicles, 10% ostracods to 200 μ m in size, favositid coral), 15% peloids in corallites (size range 25-100 μ m), 15% microspar, 40% m xyn spar fills corallites, 1% bitumen, 2% chert replaces corallite walls, some microspar in ostracods and ostracod valves, 5% dolomite replaces part of favositid corallite walls, 7% porosity (in corallites and along fractures). CL; tr bright orange-luminescent overgrowths on calcite. FLUOR; spar filling corallites is zoned, corallite walls are well defined

by fluorescence. Rock Name: sl dolomitic/microsparitic biopelsparite. C25d Sample/Slab/Thin Section Description (taken 1 m abu, contains a small spheroidal stromatoporoid), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 48% fossils consist of 5% tabular stromatoporoids (20 by 5 mm) and 10% spheroidal stromatoporoids (30 mm in diameter), 3% brach frags, 30% ossicles, 15% peloids between 25 and 100 μ m in size w/ a mode of 50 μ m, 10% microspar, 15% spar in part as syntaxial overgrowths on ossicles, 2% quartz fills porosity in stromatoporoid, 5% dolomite (size 25 μ m), cores are calcified, 5% sample porosity as 3% along fractures/stylolites and 2% between xtals. CL; non-luminescent except for some blue-luminescent fluorite after dolomite. Rock Name: sl dolomitic/microsparitic/ stromatoporoidal biopelsparite. C25e Sample/Slab Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; minor 1 mm amplitude stylolites, composition; 40% intraclasts, 20% are rd and up to 10 by 8 mm in size, 20% are 100 μ m-sized rd clasts, 20% ossicles, 15% microspar and 15% spar, 5% dolomite and 5% porosity between xtals and along stylolites. Rock Name: sl dolomitic/microsparitic fossiliferous intrasparite.

BASE OF UNIT 66.40 TOP OF UNIT 69.00 THICKNESS 2.60

UNIT C26. Weathering Character prom. Colour WS varicoloured, 'clasts' m brownish grey, 'matrix' white to buff. FS aa but sl darker. Basal Contact abrupt, planar, very sl wavy. Bedding Character breccia. Sedimentary Structures a few convex-up structures in the larger dolostone 'clasts'. Composition breccia, large buff dolostone 'clasts' to 15 cm in size, mode 4 cm, base of unit contains 1 cm-sized clasts, there is an inverse grading of clast sizes. C26 Sample/Slab/Thin Section Description (taken 0.5 m abu), fresh surface colour; vlt yellowish-orange (10YR 7/3), composition; 25% interxyn porosity, 60% breccia clasts >>2 mm, clast size range is 2-30 mm, mode is 5 mm, 30% clasts are composed of porous f xyn dolostone, 30% clasts are sparry (f xyn) f-m xyn dolostone, 15% of clasts are dolomitic f xyn sparite, 1 chert clast, 'matrix' is dolomitic f xyn sparite. Spar was originally present between the dolomite and partly replaced dolomite along xtal edges. Much of this spar was subsequently dissolved and may have resulted in the collapse that formed the breccia. CL; 5% bright orange-luminescent overgrowths on calcite, 2% dull blue-luminescent fluorite after dolomite. FLUOR; dolomite is com zoned. Rock Name: m calcirudite-sized breccia; f xyn dolostone-f xyn sparite rubble breccia.

BASE OF UNIT 69.00 TOP OF UNIT 71.00 THICKNESS 2.00

UNIT C27. Weathering Character prom. Colour WS and FS m brownish grey w/ minor yellowish-brown surface stains. Basal Contact trans over 20 cm, irregular. Bedding Character planar irregular. Bed/Lam Thickness upper half of unit has 1 to 2 cm thick beds. Base is more thickly bedded, min 2 cm, max 1 $\frac{1}{2}$ cm, mode 5 cm. Very faint lam, not laterally continuous, mostly unlam. Composition ls. Misc minor slickensides. C27 Sample/Slab Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; stylolites to 4 mm amplitude are accentuated by 40 μ m thick dk grey opaque residue, composition; 85% microspar, 5% f-m xyn spar as subvertical fracture-filling veinlets, 5% dolomite, 5% porosity. Rock Name: sl dolomitic microsparite. Sample C27 taken for conodonts.

BASE OF UNIT 71.00 TOP OF UNIT 72.80 THICKNESS 1.80

UNIT C28. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt, planar. Bedding Character wavy in 3 dimensions. Bed/Lam Thickness min 1 cm, max 3 cm, mode 2 cm, faintly lam in places, dk lams 3 mm thick, lt lams 1 to 2 mm thick. Composition dolostone w/ uniform 0.1 mm gn/xtal size. C28 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low-angle cross-lam, misc; spar-filled fractures, composition; 75% f xyn dolomitic ooids range in size from 30 to 225 μ m and have a 75 μ m mode. In porous zones the ooid centers or more com a thin zone between the central fine and outer coarser xyn dolomite lamellae of the ooids are porous, 85% f xyn dolomite (50 μ m mode), 5% f-c xyn fracture and vug-filling spar, also pseudomorphs of a former six-sided xtal, 10% sample porosity, especially high

adjacent to fractures and stylolites, some lams have high porosity (both between and within ooids). CL; calcite luminesces a very dull orange and spar-veinlets are non-luminescent. Tr blue-luminescent fluorite after dolomite. FLUOR; spar filling vugs and fractures is zoned. Rock Name: cross-lam calcarenite; sl sparry oolitic dolostone.

BASE OF UNIT 72.80 TOP OF UNIT 73.20 THICKNESS 0.40

UNIT C29. Weathering Character prom. Colour WS and FS buff. Basal Contact abrupt, sl wavy. Bedding Character inversely-graded rubble breccia. Composition breccia, 70% 'clasts', 30% 'matrix', clast size (in basal 1 m) is 2 mm to 3 cm, mode 1 cm, no large clasts near base, clasts ang to sbang, subequant and randomly oriented. Misc the unit is traceable on the other (west) side of the stream where its lt colour is quite distinctive, also-large clasts of dolomitic ls occur at the top of the unit, however, there are no inclusions of the overlying unit C30 in this unit. 0.7 m abu 10% of clasts are 3 cm and larger and are randomly oriented, sbang to sbrd, and with the same litho as unit C28, another 15 cm long sbrd clast is subparallel to bedding and contains 3 cm-long chert nodules. Sbrd broken frags occur in upper 0.5 m which is m to dk brownish grey. C29 Sample/Slab/Thin Section Description (taken from base of unit where the breccia is poorly sorted), fresh surface colour; wk vlt yellowish-orange (10YR 7/2) composition; breccia, 60% of clasts are larger than 2 mm, clast size range is 2 to 18 mm w/ a 7 mm mode, 2% polyxyn quartz clasts, 70% f xyn dolostone clasts, 50% are very porous, f xyn sparite 'matrix'. Some clasts are entirely dissolved. There is extensive evidence of calcification of dolomite followed by dissolution of calcite. CL; calcite luminesces dull orange w/ 5% bright orange-luminescent overgrowths, dolomite is non-luminescent except for 2% scattered dull blue-luminescent fluorite after dolomite. Rock Name: m calcirudite-sized breccia; sparry ('matrix') vuggy dolostone 'clast' breccia.

BASE OF UNIT 73.20 TOP OF UNIT 75.00 THICKNESS 1.80

UNIT C30. Weathering Character prom. Colour WS m to dk brownish-grey. FS m brownish grey. Basal Contact irregular, unit C30 is downdropped on subvertical normal faults w/ displacement to 10 cm. Bedding Character planar, irregular. Bed/Lam Thickness min 1 cm, max 15 cm at base, mode 3 cm. Composition calc dolostone, gn/xtal size is 0.2 mm, contains 40% intraclasts. Thin fossiliferous zone near base. Sedimentary Structures dk grey chert nodules are 2.9 m abu. Fossils tr brachs, echinoderm stems to 5 mm long and ossicles, possibly minor ostracods, algal balls 2 cm long. C30 Sample/Slab Description (taken of rd intraclasts near base, litho sample is rep of basal 30 cm). fresh surface colour; wk vlt yellowish-orange (10YR 7/2) composition; 64% rd intraclasts ranging from 100 to 300 μ m in size, mode 200 μ m, composed of microspar, 3% ossicles, 3% ostracods, 20% spar, 5% f xyn dolomite concentrated along stylolites, 5% porosity. Rock Name: sl dolomitic fossiliferous intrasparite. C30a Sample Description (taken of large intraclasts 0.5 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), composition; 15% ostracods, tr ossicles, 80% microspar, 5% interxyn porosity. Rock Name: ostracodal biomicrosparite. C30b Sample Description (ball-like structure), lt olive-brown (10YR 6/3), 90% f xyn spar, 10% porosity. Rock Name: f xyn sparite. C30c Sample/Slab/Thin Section Description (taken 3.4 m abu, contains 1 cm-sized intraclasts), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; low-amplitude stylolites, composition; 10% ostracods to 1 mm in size, 40% peloids w/ a size range from 25 to 50 μ m and a mode of 35 μ m, 15% microspar, 25% spar between peloids, 5% dolomite, 5% porosity between xtals and along stylolites. CL; 5% multi-fold orange luminescent calcite overgrowths, calcite generally luminesces a very dull orange. Subvertical veinlets are also bright orange luminescent. Rock Name: sl dolomitic/microsparitic ostracodal pelsparite.

BASE OF UNIT 75.00 TOP OF UNIT 78.90 THICKNESS 3.90

UNIT C31. Weathering Character prom. Colour WS and FS buff beds interbedded w/ m to dk brownish grey beds. Basal Contact abrupt, sl planar to wavy. Bedding Character abrupt, sl wavy at base (stromatolites), locally brecciated. Bed/Lam Thickness min 1 cm, max 10 cm, mode 4 cm, very faint planar and sl wavy lams, 4 by 5 cm, hummocky structures are stromatolites. Composition microxyn dolostone. Sedimentary Structures high-amplitude

stylolites, locally brecciated.

Description of dk greyish bed. Bedding Character planar. Bed/Lam Thickness min 1 cm, max 6 cm, mode 3 cm, dk lams 8 mm thick, lt ones 3 to 4 mm thick, lams are laterally continuous for at least 40 cm. Composition calc dolostone, grey units form the majority of the interbedded units (about 70%), intraclasts (at least 30% on bedding surface) to one cm in size, high relief on bedding plane surfaces. Sedimentary Structures convex-up structures, (wavelength 0.5 m, amplitude 4 cm), overlain by individual 'digits' 1 cm wide and 3 cm high. grey chert nodules to 30 cm in size at base of unit. C31 Sample/Slab/Thin Section Description fresh surface colour; lt olive brown (10YR 6/3), sedimentary structures; 4 mm amplitude stylolites, lams vary laterally in thickness, misc; fractures filled w/ spar, composition; 62% peloids (25 to 75 μ m in size, 50 μ m mode), 10% microspar, 20% spar as 5% spar veinlets filling fractures and 15% between peloids, tr pyrite, misc; tr f xyn spar is pseudomorphic after 1 mm long gypsum xtals, 3% f xyn dolomite, 5% porosity in fractures and along stylolites as well as between xtals. CL; non-luminescent except for tr bright orange-luminescent calcite overgrowths. Rock Name: sl dolomitic/microsparitic pelsparite. C31a Sample/Slab/Thin Section Description (rep of the brownish grey unit), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; minor low-amplitude stylolites, 5% disarticulated ostracods or brachs, 77% peloids (25 to 50 μ m w/ a 35 μ m mode), 5% spar fills fractures, gastropods, and articulated ostracods, 8% dispersed f xyn dolomite, 5% porosity along fractures, stylolites and between xtals. CL; tr bright orange luminescent spar fills vugs. Rock Name: sl dolomitic/fossiliferous pelsparite. C31b Sample/Slab/Thin Section Description (of buff unit taken about 6 m abu, stromatolites(?) in a 10 cm thick zone), fresh surface colour; vlt yellowish-orange (10YR 7/3), sedimentary structures; digitate stromatolites, 'digits' 8 mm wide by 30 mm high, stylolites have amplitudes to 1 mm, composition; 10% intraclasts in interdigitate areas, size to 2 mm, mode is 0.2 mm, intraclasts composed of microspar, 35% peloids, 10% microspar, 40% f xyn spar, tr chert, 5% porosity between xtals/gns and along stylolites and fractures. CL; 10% bright orange-luminescent overgrowths on calcite line and fill vugs. Overgrowths occur only on the sides open to pore space. Tr blue-luminescent fluorite after dolomite. Rock Name: intraclastic/microsparitic pelsparite. C31c Sample/Slab Description (taken between convex-up structures), fresh surface colour; wk xlt yellowish-orange (10YR 8/2), sedimentary structures; cross-stratification, misc; tr fractures, composition; 20% f-m xyn spar between f xyn dolomite, spar is preferentially concentrated in a few mm thick lams and in fractures, 75% f xyn dolomite (originally gns?) with a 40 μ m size mode, 5% interxyn sample porosity. Rock Name: cross-stratified c dololite; sparry dolostone. C31d Sample/Slab Description (of small stromatolite, taken about 2 cm above large stromatolites), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; digitate stromatolites, clotted microsparite texture. It may be a pelmicrospar, 5% spar fills fractures, 3% bitumen, 5% f xyn spar fills moulds or replaces gypsum xtal laths to 10 mm long, 3% dispersed f xyn dolomite, 5% interxyn porosity. Rock Name: stromatolitic sl dolomitic/sl bitumenous/sparry clotted microsparite. C31e Sample/Slab/Thin Section Description fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; digitate stromatolites, misc; minor fractures, 15% intraclasts (to 300 μ m in size) occur between the digits of the stromatolites, 45% microspar and 25% spar in a clotted texture, 1% pyrite, fractures in part lined by spar, high inclusion percentage in stromatolites compared to sediment between digits. 4% f xyn dolomite as dispersed patches in stromatolites, dolomite to 80 μ m, rhombs in part calcified, especially the dolomite rhomb cores, 10% porosity as 3% fracture porosity and 7% interxyn porosity (especially high near fractures). CL; mat'l between non-luminescent stromatolites has bright orange-luminescent overgrowths on xtals/gns. Orange luminescent calcite overgrowths occur along subvertical fractures. 2% dull blue luminescent fluorite after dolomite is concentrated in coarser grained/xyn lams. Rock Name: intraclastic-rich microsparite/f xyn sparite.

BASE OF UNIT 78.90 TOP OF UNIT 89.50 THICKNESS 10.60

UNIT C32. Weathering Character prom (forms traceable ledge). Colour WS buff down valley and in inlet cliffs. FS m brownish grey. Basal Contact wavy, convex-up. Bedding Character

unbedded, wavy to hummocky, 1 m wide, faintly lam, locally brecciated. Bed Thickness 1 cm. Composition microxyn calc dolostone. Sedimentary Structures hummocky and convex-up structures (7 cm amplitude, 20 cm wide), high-amplitude stylolites near base, chert nodules to 30 cm in size. C32 Sample/Slab Description lt grey chert consists of spherules to 120 μ m in diameter, may represent replaced peloids, irregular thin brown streaks consist of lt brown spherules (original peloids?). C32a Sample/Slab/Thin Section Description (contains hummocky structures w/ high amplitude stylolites), fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; convex-up and wavy structures, misc; very high amplitude stylolites, composition; one stick bryozoan?, 35% microspar, 40% mainly f xyn spar but ranges to m xyn spar, 25% porosity as irregularly shaped vugs to 60 μ m in size, may be related to dissolution of ls (very high amplitude stylolites). CL; 3% pervasive but thin bright luminescent overgrowths on non-luminescent calcite cores. Rock Name: stylolitic microsparitic f xyn sparite.

BASE OF UNIT 89.50 TOP OF UNIT 90.90 THICKNESS 1.40

UNIT C33. Another interbedded grey and buff unit, similar to unit C31, however, stromatolites are not as abundant. Weathering Character prom. Colour WS and FS buff interbedded w/ m to dk brownish grey. Basal Contact abrupt. Bedding Character indet. Composition sl dolomitic ls to dolostone. Sedimentary Structures high-amplitude stylolites. C33 Sample/Slab/Thin Section Description (taken from basal 2.5 m thick dk grey intraclastic zone), fresh surface colour; mottled vlt yellowish orange (10YR 7/3) and wk m olive-brown (10YR 5/2), sedimentary structures; tr stylolites w/ amplitudes to 1 mm, composition; 30% fossils consist of 5% articulated ostracods to 13 mm, in size w/ 400 μ m thick valves, geopetal structure (spar at top, pelspar below in articulated ostracods), 20% undifferentiated bioclastic mat'l, mainly shell frags, 5% stromatoporoid frags, tr ossicles, tr gastropods, 25% peloids (100 to 250 μ m, mode 150 μ m), 5% microspar, 5% spar, tr pyrite, 30% dolomite (35 μ m mode), dolomitic areas are mottled, boundaries between dolomitic mottles and pure ls are stylolitic and sharp, 5% interxyn porosity. CL; fossil frags are non-luminescent, calc mat'l between fossil frags luminesces dull red, one large ostracod is filled w/ zoned orange-luminescent spar. T $\pm$ blue-luminescent fluorite after dolomite. Rock Name: dolomitic/sl sparry biopelmicrosparite. C33a Sample/Slab/Thin Section Description (taken from thicker bedded zone in middle of overlying buff subunit), fresh surface colour; wk xlt yellowish orange (10YR 8/2), 60% rd dolomitic intraclasts (to 35 mm long and 8 mm wide), 15% m to c xyn spar between intraclasts, 25% porosity between intraclasts, high percentage of rhombohedral pores within intraclasts, some dolomite rhombs are dissolved. CL; 3% bright orange-luminescent calcite overgrowths on non-luminescent calcitic cores. Intraclasts have a very dull pink luminescence. FLUOR; spar filling vugs is zoned. Rock Name: vuggy dolomitic intrasparite. C33b Sample/Slab/Thin Section Description (taken from next overlying grey unit), fresh surface colour; vlt yellowish orange (10YR 7/3), sedimentary structures; mottles are separated from each other by low-amplitude stylolites and consist of pelspar (dk) and f xyn spar (lt), modal mottle size is 3 mm, approx 45% dk mottles, 55% lt intermottle mat'l, 60% peloids, 25% f-m xyn spar, <1% pyrite, 5% dispersed f xyn dolomite (most is calcified), 10% porosity along fractures and between xtals, interxyn porosity is highest near fractures. CL; 2% bright orange-luminescent calcite overgrowths in vugs, some of which are filled w/ dull orange-luminescent calcite. About 3% dull blue-luminescent clear fluorite after dolomite is scattered uniformly throughout the sample. Rock Name: mottled sl dolomitic pelsparite. C33c Sample/Slab/Thin Section Description (taken from buff subunit about 5 m abu), fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; lam/thin bedded, composition; 1% carb flakes, 1% spar, tr malachite staining, 73% f xyn dolomite (mode 30 μ m) some of which has been calcified (some of this calcite may have later been dissolved), 25% porosity. CL; non-luminescent except for a few bright orange-luminescent dolomite xtals. Rock Name: f xyn dolostone.

BASE OF UNIT 90.90 TOP OF UNIT 98.20 THICKNESS 7.30

UNIT C34. Weathering Character prom. Colour WS lt brownish grey. FS m brown. Basal Contact hummocky (amplitude 30 cm). Bedding Character 15 cm wide hummocky and wavy

structures, locally brecciated. Bed Thickness one bed, thin brown lams. Composition calc dolostone, 4-5% carb content, black chert nodules are elongate subparallel to bedding, upper 10 cm is ls, perhaps secondary calcite, possibly brecciated and hummocky. Sedimentary Structures; high-amplitude stylolites. C34 Sample/Slab/Thin Section Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; high-amplitude stylolites, 15% microspar, 61% spar, 10% length slow chalcedony nodules and spherules to 2 cm long, elongate spherules have a radial fibrous texture, 4% patch of dolomite (30 μ m xtal size mode), 10% porosity along fractures and stylolites, porosity also in chert nodules/spherules and between xtals, interxyn porosity is especially high near fractures/stylolites. CL; non-luminescent except for 3% dull blue-luminescent uniformly scattered fluorite after dolomite. Rock Name: sl dolomitic/brecciated chert nodular f xyn sparite.
BASE OF UNIT 98.20 TOP OF UNIT 98.80 THICKNESS 0.60

UNIT C35. Weathering Character rec covered interval.
BASE OF UNIT 98.80 TOP OF UNIT 101.20 THICKNESS 2.40

UNIT C36. Weathering Character prom. Colour WS buff. FS m brownish grey. Basal Contact covered. Bedding Character convex-up structures, locally brecciated, small domal structures at base grade up to large hummocky structures (10 cm long by 3 cm high) about 2 m abu. 6 m abu convex-up structures are 2.5 m wide and 0.3 m high. Bed/Lam Thickness min <1 mm, max 40 cm, mode 25-30 cm. Composition calc dolostone, lam, 1 thin dk brownish carb lam. Sedimentary Structures local breccia, convex-up structures to 2.5 m wide and high-amplitude stylolites. C36 Sample/Slab/Thin Section Description (of convex-up structure taken from base of unit), fresh surface colour; vlt yellowish orange (10YR 7/3), sedimentary structures; high-amplitude (to 2 mm) stylolites, hummocky convex-up structures, 20% microspar, 50% f xyn spar, 10% m xyn spar lines fractures and stylolites, 10% f xyn dolomite (30 μ m mode) is concentrated in hummocky structures and is partly calcified, 10% porosity (5% along stylolites and fractures and 5% between xtals). Interxyn porosity is especially high adjacent to stylolites and fractures. CL; 3% bright orange-luminescent calcite overgrowths w/ complex zonation fills fractures and vugs. 3% dull blue-luminescent fluorite after dolomite, some of which is concentrated along veinlets. Rock Name: dolomitic/microsparitic f xyn sparite.
BASE OF UNIT 101.20 TOP OF UNIT 108.70 THICKNESS 7.50

UNIT C37. Weathering Character semi-prom. Colour WS and FS white. Basal Contact hummocky. Bedding Character brecciated (inaccessible exposure). C37 Sample/Slab/Thin Section Description fresh surface colour; wk xlt yellowish orange (10YR 8/2), low-amplitude stylolites, composition; breccia, ang 'clasts' are bounded by stylolites such that these are solution breccia clasts, 35% coated gns, 2 w/ concentric lamellae (0.2 mm in size), most are relict moulds (15%) or coated gn moulds filled w/ variously dolomitic spar (20%), mould size-0.5 mm, 15% spar fills moulds of dissolved coated gns(?), tr pyrite and <1% chert fills moulds of coated gns(?), 50% dolomite 'clasts' consist of 20% aphanoxyn dolomite and 30% vf and f xyn dolomite, limpid dolomite lines some vugs many of which are filled w/ spar. Calcification of dolomite by spar is com, 25% porosity as coated gn moulds, along fractures and stylolites, interxyn porosity is especially high near fractures and stylolites. CL; non-luminescent except for 1% bright orange-luminescent spar filling vugs. Rock Name: vuggy and sparry coated gn aphanoxyn to f xyn dolostone.
BASE OF UNIT 108.70 TOP OF UNIT 109.30 THICKNESS 0.60

UNIT C38. Weathering Character semi-prom. Colour WS and FS mottled, lt and m brownish grey. Basal Contact abrupt, perhaps planar. Bedding Character massive, bioturbated. Composition calc dolostone, bioturbated ('tubes'), mottle patches to 2 cm in size. Sedimentary Structures 'worm tubes'. Fossils sparse brachs. C38 Sample/Slab/Thin Section Description (taken from middle of unit, note 'worm tubes'), mottled m olive-brown (10YR 5/3) and lt olive-brown (10YR 6/3), sedimentary structures; lt olive brown calc dolomite mottles to 2-cm in size in which 1 mm diameter 'worm tubes' are concentrated. The m olive-brown mottles consist mainly of clotted and peloidal sparite. Wispy low-amplitude

stylolites occur throughout the rock, composition; tr undifferentiated shell frags, 1 articulated ostracod, 30% peloids, 25% microspar and 15% spar in a clotted texture, 20% dolomite, 1 mm diameter 'worm tubes' are filled w/ sparry f-m xyn dolomite, some are lined w/ clear 100 μ m-sized dolomite rhombs and filled with spar, calcified dolomite is com, 10% porosity between xtals and along stylolites. CL; calcite and fossil frags are non-luminescent, dolomite luminesces a very dull red. Rock Name: dolomitic pelmicrosparite/f xyn sparite. C38a
Sample/Slab Description (taken from middle of unit, contains brachs), fresh surface colour; wk lt olive-brown (10YR 6/2), 2% brachs one of which is 9 mm wide and cf *Atrypoides*, 3% ostracods, 30% m xyn dolomite, 60% microspar, 5% porosity.
BASE OF UNIT 109.30 TOP OF UNIT 111.50 THICKNESS 2.20

UNIT C39. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact trans over 10 cm, planar. Bedding Character planar irregular. Bed Thickness min 1 cm, max 5 cm, mode 2 cm. Composition intraclastic dolomitic ls, 50% intraclasts range from 1 to 4 mm in size. C39 Sample/Slab/Thin Section Description (taken from middle of unit, contains possible intraclasts and/or 'worm tubes'), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; minor low-amplitude stylolites, 2% undifferentiated frags to 5 mm, shells 120 μ m thick, 53% peloids, 15% microspar, 10% f-m xyn spar, tr pyrite, 15% m xyn dolomite (mode 70 μ m) occurs preferentially in sparry areas between peloids, calcification of dolomite is com, 5% porosity along stylolites and between xtals, especially in a zone adjacent to stylolites. CL; non-luminescent. Rock Name: dolomitic/sparry pelmicrosparite.

BASE OF UNIT 111.50 TOP OF UNIT 112.20 THICKNESS 0.70

UNIT C40. Weathering Character semi-rec. Colour WS m grey. FS m brownish grey. Basal Contact trans over 10 cm, intraclasts decrease upwards in abundance. Bedding Character mottled. Bed Thickness thin bedded near upper contact. Composition sparsely fossiliferous ls, mostly bioturbated. Sedimentary Structures hummocky structures. Sample C40 (conodonts) taken.

BASE OF UNIT 112.20 TOP OF UNIT 112.40 THICKNESS 0.20

UNIT C41. Weathering Character semi-prom. Colour WS buff to white. FS buff. Basal Contact sl wavy (wavelength 20 cm, amplitude 2 cm), irregular. Bedding Character wavy, convex-up structures, contorted bedding (20 cm wide and 10 cm high). Bed/Lam Thickness min 1 cm, max 4 cm, mode 1 to 2 cm, faintly lam. Composition calc dolostone, minor carb mat'l (<1%).

BASE OF UNIT 112.40 TOP OF UNIT 112.80 THICKNESS 0.40

UNIT C42. Weathering Character semi-prom. Colour WS lt buff. FS vlt brownish grey. Basal Contact abrupt, convex-up. Bedding Character planar. Bed/Lam Thickness min 4 cm, max 10 cm. Composition calc dolostone, fossiliferous. Sedimentary Structures coated gns, vugs. Fossils sparse brachs. C42 Sample/Slab/Thin Section Description (taken from upper contact), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; coated gns to 20-mm long, most are elongate parallel to bedding, stylolites, com occur only within coated gns which display internal solution microunconformities. In some cases outer lamellae have been moved to center of coated gn by dissolution within the coated gn, composition; 60% coated gns, modal size 1.3 mm, range 0.2 to 20 mm, 20% microspar, 10% f xyn spar, some coated gns have multiple nuclei, 5% f xyn dolomite (30 μ m mode), 5% fracture/interxyn/ vuggy porosity. CL; coated gns luminesce a very dull orange-red, mat'l between coated gns is non-luminescent. There are one or two hairline fractures filled w/ bright orange-luminescent calcite. Rock Name: sl dolomitic/sparry (cement) coated gn microsparite. Sample C42a of small brach (7 mm wide), one specimen cf. *Atrypoides*.

BASE OF UNIT 112.80 TOP OF UNIT 113.20 THICKNESS 0.40

UNIT C43. Weathering Character semi-prom. Colour WS lt buff. FS vlt brownish grey. Basal Contact trans wavy, wavelength 1.5 m, amplitude 2 cm. Bedding Character planar. Bed

Thickness 2 beds, each 35 cm thick. Composition dolostone w/ a 0.1 mm gn/xtal size. Fossils brach shell frags <1% of rock, a few are still articulated (<1%), valves to 1 cm in size. C43 Sample/Slab Description fresh surface colour; wk vlt yellowish-orange (10YR 7/2), 5% undifferentiated shell frags, 1 articulated ostracod 2.5 mm wide, filled w/ dolomitic spar, 10% microspar/spar, 70% f xyn dolomite (50µm mode), 15% interxyn porosity. Rock Name: microsparitic/fossiliferous f xyn dolostone.

BASE OF UNIT 113.20 TOP OF UNIT 113.90 THICKNESS 0.70

UNIT C44. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt, planar. Bedding Character wavy and convex-up. Bed/Lam Thickness min 3 cm, max 22 cm, mode 7 cm. Composition dolostone, 0.2 mm modal gn/xtal size. Sedimentary Structures club-shaped convex-up structures, mottled (burrowed unit) just below convex-up structures (local occurrence). C44 Sample/Slab/Thin Section Description (of club-shaped stromatolitic structure), fresh surface colour; vlt yellowish orange (10YR 7/3), sedimentary structures; convex-up club-shaped stromatolitic structure, 20 cm high, 12 cm wide, composition; 40% microspar, 4% spar, 1% gypsum xtal moulds (some swallowtail) to 8 mm long, interlam f-m xyn dolostone and microsparite, lams 0.2-1 mm thick, 50% f-m xyn dolomite, 10% interxyn porosity, minor gypsum moulds in part filled w/ clear f xyn spar. CL; dolomite luminesces a very dull red, calcite is mainly non-luminescent w/ the exception of spar filling gypsum xtal moulds which have bright orange-luminescent calcite overgrowths. Rock Name:

microsparitic/sl sparry f xyn dolostone. C44a Sample/Slab Description fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; large convex-up stromatolitic structure (10 cm high by 8 cm wide), 25% microspar, 70% f-m xyn dolomite, 5% interxyn porosity. Rock Name: microsparitic f-m xyn dolostone.

BASE OF UNIT 113.90 TOP OF UNIT 115.15 THICKNESS 1.25

UNIT C45. Weathering Character semi-prom (extensively weathered). Colour WS and FS m brownish grey. Basal Contact wavy. Bedding Character indet, possibly planar irregular. Bed/Lam Thickness possibly 2 cm mode. Composition calc dolostone, probably bioturbated and intraclastic, rd intraclasts (1 to 2 mm in size), comprise 50% of unit. C45 Sample/Thin Section Description (taken from middle of unit), fresh surface colour; mottled vlt yellowish orange (10YR 7/3 and wk lt olive-brown (10YR 6/2), sedimentary structures; stylolites, 30% peloids, 13% microspar, 5% spar, 45% f-m xyn dolomite (mode 50µm), dolomitic mottles are separated from sparry pelmicrosparitic areas by stylolites, 7% porosity along fractures and stylolites and between xtals (especially high near stylolites and fractures). CL; spar between calc peloids is non-luminescent, peloids themselves luminesce a very dull red. There is one bright orange-luminescent hairline fracture. Rock Name: mottled pelmicrosparitic f-m xyn dolostone.

BASE OF UNIT 115.15 TOP OF UNIT 116.55 THICKNESS 1.40

UNIT C46. Weathering Character semi-prom. Colour WS and FS buff (basal 2 m or more is m brownish grey). Basal Contact mainly scree covered but possibly trans, planar. Bedding Character convex-up structures (20 cm wide and 10 cm high). Bed/Lam Thickness min 1 cm, max 25 cm, mode 10 cm, lams dk and lt (1 to 2 mm thick). Composition calc dolostone, coated gns in basal 2 m are intraclastic and c gn. Sedimentary Structures small convex-up structures (20 cm wide and 10 cm high), high-amplitude stylolites. C46 Sample/Slab/Thin Section Description (taken 1 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; high-amplitude stylolites, boundaries of coated gns and relict pelmicrospar are stylolites, composition; 50% coated gns w/ multiple nuclei, some are superficial coatings. In some coated gns the superficial coating is faulted due to compaction, dissolution or both, 10% microspar between coated gns and relict peloids, 25% f-c clear spar between coated gns and relict pelmicrosparite, spar is elongate perpendicular to gn boundaries. tr pyrite, tr f xyn dolomite, 15% porosity (10% as vugs to 2 mm, 5% porosity between coated gns and between xtals). FLUOR; spar between peloids is vaguely zoned. Rock Name: coated gn (pelmicrosparitic) sparite. C46a Sample/Slab/Thin Section Description (taken of convex-up structures 2.8 m abu), fresh surface colour; lt olive-brown (10YR 6/3),

sedimentary structures; convex-up structure (part of club-shaped stromatolite), minor low-amplitude stylolites, 60% peloids consist of microspar, peloids range from 30 to 200 μ m in size and have a 50 μ m mode, 15% microspar, 10% f-c xyn spar, 15% porosity in vugs (to 6 mm in size) and along stylolites. CL; non-luminescent. Rock Name: sparry pelmicrosparite. C46b Sample/Slab/Thin Section Description (contains convex-up structures, taken 30 cm abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; high-amplitude (to 2 mm) stylolites com truncate coated gns, 60% coated gns to 5 mm in size are composed of pelmicrospar, approx 30% have multiple nuclei. 5% microspar, 29% spar, tr pyrite, 1% f xyn dolomite, 1 rhomb is calcified, 5% porosity between xtals and as small vugs to 0.5 mm in size, porosity com occurs between the coatings and the central pelmicrospar of the coated gns. CL; tr bright blue-luminescent fluorite after dolomite. Coated gns luminesce very dull and spar between them is non-luminescent. Rock Name: microsparitic coated gn f-m xyn sparite. BASE OF UNIT 116.55 TOP OF UNIT 120.35 THICKNESS 3.80

UNIT C47. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact trans over 5 to 10 cm, hummocky. Bedding Character indet, planar irregular w/ cross-strata (strike 105°, dip 20°N. Composition calc dolostone, 50% 1 to 2 mm rd intraclasts. Sedimentary Structures intraclasts and cross-stratification. Sample C47 cross-bedding of intraclasts, fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; cross-bedding (1 set is 40 cm thick) and normal graded bedding, detrital carbonate ranges in size from m calcirudite to c calcilutite, composition; 30% rd intraclasts to 5 mm in size, composed of microspar to dolomitic microspar, tr shell frags, 60%, dolomite (50 μ m), calcilutite-sized mat'l has been preferentially dolomitized, larger mm-sized intraclasts consist of either microspar or dolomitic microspar, 10% porosity between xtals and clasts. Rock Name: cross-stratified m calcirudite to c calcilutite (overall calc dolostone). BASE OF UNIT 120.35 TOP OF UNIT 121.05 THICKNESS 0.70

UNIT C48. Weathering Character rec buff unit, mostly covered. Basal Contact abrupt planar. BASE OF UNIT 121.05 TOP OF UNIT 121.30 THICKNESS 0.25

UNIT C49. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact abrupt, sl wavy. Bedding Character indet, possibly planar irregular. Composition calc dolostone, probably bioturbated, rd intraclasts 1 to 2 mm in size comprise 50% of rock. C49 Sample/Slab Description (taken from middle of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; 15% lt grey chert nodule 4 by 1 cm, elongate parallel to bedding, composition; 50% rd intraclasts to 1 cm long (6 mm mode), composed of microspar, tr brach frags to 3 mm, 45% f-m xyn dolomite between intraclasts, 5% interxyn porosity. Rock name: mottled chert nodular m calcirudite: intraclastic f-m xyn dolostone. BASE OF UNIT 121.30 TOP OF UNIT 122.10 THICKNESS 0.80

UNIT C50. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt planar. Bedding Character low angle cross-bedding. Composition dolomitic ls. Sedimentary Structures low angle crossbedding, dip to east, high-amplitude stylolites. C50 Sample/Slab/Thin Section Description (of cross-stratification), fresh surface colour; interbedded dolostone (lt olive brown, 10YR 6/3) and ls (wk m olive-brown, 10YR 5/2), sedimentary structures; cross-bedded, sets approx 30 mm thick, 1 mm amplitude stylolites separate calc dolostone from dolomitic microsparite, also moderate bioturbation (mm-sized tubes), misc; minor subvertical f xyn spar veinlets, composition; 12% intraclasts to 3 mm in size, 1 stick bryozoan frag-zooecia are 150 μ m in diameter, 10% microspar between dolomite rhombs, 3% spar, 60% f xyn inclusion-rich dolomite, minor calcification of dolomite and minor vug-lining m xyn clear dolomite, vugs filled in part by spar, 15% interxyn porosity, tr vugs along fractures. CL; overall very dull red luminescent dolomite w/ the exception of one calc veinlet which has thin bright luminescent overgrowths on calcite. Rock Name: cross-stratified intraclastic f xyn dolostone. BASE OF UNIT 122.10 TOP OF UNIT 122.30 THICKNESS 0.20

UNIT C51. Weathering Character semi-prom (extensively weathered). Colour WS and FS m brownish grey. Basal Contact abrupt, planar. Bedding Character indet, possibly planar irregular. Composition calc dolostone. Sedimentary Structures changes to mottled unit laterally. C51 Sample/Slab/Thin Section Description (taken from trans zone below upper contact), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; minor low-amplitude wispy laterally discontinuous stylolites, composition; 1% brach frags, 2 mm long, one is spiculated, tr ostracods to 125 μ m in size, 50% peloids range from 35-200 μ m in size, mode is 50 μ m, 10% microspar and 9% mainly f xyn spar between peloids, 25% f xyn dolomite (40 μ m mode) occurs preferentially between peloids and com contains microspar ghosts or microspar inclusions, 5% porosity (interxyn and along stylolites). CL; non-luminescent. Rock Name: sparry/dolomitic (f xyn) pelmicrosparite.
BASE OF UNIT 122.30 TOP OF UNIT 123.40 THICKNESS 1.10

UNIT C52. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact trans. Bedding Character hummocky and wavy. Bed Thickness min 1 cm, max 3 cm, mode 2 cm. Composition calc dolostone. Sedimentary Structures hummocky and wavy structures, 20 cm wide, 3 cm amplitude.
BASE OF UNIT 123.40 TOP OF UNIT 123.90 THICKNESS 0.50

UNIT C53. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact wavy, stromatolitic. Bedding Character indet, possibly planar irregular. Composition calc dolostone, in part intraclastic. Sedimentary Structures wavy structures are very small (3 cm wide) in upper half of unit, separated by 3 cm.
BASE OF UNIT 123.90 TOP OF UNIT 124.40 THICKNESS 0.50

UNIT C54. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt, wavy, hummocky. Bedding Character hummocky. Bed Thickness min 1 cm, max 25 cm, mode 10 cm. Composition calc dolostone. Sedimentary Structures hummocky structures.
BASE OF UNIT 124.40 TOP OF UNIT 124.70 THICKNESS 0.30

UNIT C55. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact obscured. Bedding Character hummocky, wavy. Bed Thickness mode 2 cm. Composition calc dolostone. C55 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; bioturbation (1 mm 'tubes') and larger mottles, composition; 15% intraclasts to 15 mm long, composed of pelspar, 40% microspar, 5% spar, tr pyrite, 35% f xyn dolomite, mode 50 μ m, some dolomite is replaced by clear spar, 5% sample porosity consists of interxyn porosity mainly in dolomitic areas, porosity also occurs along stylolites. CL; non-luminescent. Rock Name: dolomitic/sl sparry intramicrosparite.
BASE OF UNIT 124.70 TOP OF UNIT 125.00 THICKNESS 0.30

UNIT C56. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt, wavy. Bedding Character wavy. Bed/Lam Thickness min 1 mm, max 25 cm, mode 10 cm; 1 mm thick lams are dk and lt. Composition calc dolostone. Sedimentary Structures small wavy structures. C56 Sample/Slab/Thin Section Description fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; mottles, low-angle cross-lam, 23% microspar, 2% spar, 70% f-m xyn dolomite (50 μ m mode), partially calcified to microspar, 5% interxyn porosity. CL; non-luminescent. Rock Name: cross-lam microsparitic f-m xyn dolostone.
BASE OF UNIT 125.00 TOP OF UNIT 125.40 THICKNESS 0.40

UNIT C57. Weathering Character semi-prom. Colour WS and FS grey. Basal Contact trans over 5 cm. Composition dolomitic ls. Sedimentary Structures moderately bioturbated. C57 Sample/Slab/Thin Section Description (taken from base of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; 4 mm wide 'tubes' on bedding plane surfaces, moderate bioturbation, also minor wispy laterally discontinuous stylolites, 25% microspar, 1% clear spar lines fractures, tr opaque metallic minerals, 69% f-m xyn dolomite

(mode 40 μ m), com calcified to microspar, 5% sample porosity along fractures, stylolites and between xtals. CL; an overall very dull red luminescence. Rock Name: microsparitic f-m xyn dolostone.

BASE OF UNIT 125.40 TOP OF UNIT 125.90 THICKNESS 0.50

UNIT C58. Weathering Character rec covered interval.

BASE OF UNIT 125.90 TOP OF UNIT 131.65 THICKNESS 5.75

UNIT C59. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact covered. Bedding Character planar irregular, 1 to 2 m abu there is an extensively bioturbated zone w/ burrows to 1 cm in size. One m above orange weathering bed (3.9 m abu) there is a mottled unit that becomes less mottled higher in the sequence, the upper 3.3 m of the unit is not bioturbated. Bed/Lam Thickness min 1 cm, max 0.5 m, mode 4-5 cm, fractures obscure bed thickness. Composition calc dolostone, contains chert nodules, dk grey, elongate parallel to bedding, 5 cm long by 2 cm thick, rd, <1% of outcrop, 20-30% intraclasts, fossiliferous. Two m abu there is a 2 cm thick orange weathering bed. Sedimentary Structures bioturbation and chert nodules, high-amplitude stylolites. Fossils brachs throughout, echinoderm stems and ossicles. C59 Sample/Slab/Thin Section Description fresh surface colour; mottled wk lt olive-brown (10YR 6/2) and wk m olive-brown (10YR 5/2), sedimentary structures; bioturbation-1 mm sized 'tubes' are com subparallel to bedding, wispy low-amplitude stylolites, 7% fossils consist of 1% ossicles, 1% ostracods, 5% undifferentiated shell frags, tr algae w/ cellular structure, 38% peloids range in size from 25-80 μ m, 10% micrite, 10% micropar, 15% spar, tr pyrite, 15% dolomite near stylolites, corrosion and replacement of dolomite by microspar is com, 5% interxyn porosity. CL; 60% moderate orange-luminescent calcite overgrowths on peloids. Spar between peloids is non-luminescent. Rock Name: micritic/microsparitic/ fossiliferous dolomitic pelsparite. C59a Sample Description one small articulated brach 6 mm wide, one 2 mm diameter 'tube') on bedding plane. C59b Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; high-amplitude (1 mm) stylolites, composition; 40% rd intraclasts to 10 mm, 20% fossils consist of tr undifferentiated shell frags, 15% articulated ostracods (mode is 0.5 mm in size), 35% f-c xyn spar, tr pyrite, 5% porosity along stylolites, fractures and between xtals (high near stylolites and fractures). CL; very dull orange-luminescent peloids, spar cement has a bright orange-luminescent zone (5%). FLUOR; lt brown fluorescent peloids, mat'l between peloids is non-fluorescent. Rock Name: ostracodal intrasparite. C59c Sample/Slab Description (taken from extensively bioturbated lower part, 3.5 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; minor stylolites, composition; 10% rd intraclasts to 10 mm in size, composed of pelmicrospar, tr undifferentiated shell frags, 20% peloids, 35% microspar, 5% spar, tr pyrite, 25% f xyn dolomite (mode 30 μ m) near stylolites, 5% interxyn porosity. Rock Name: intraclastic dolomitic/ pelmicrosparite.

BASE OF UNIT 131.65 TOP OF UNIT 138.85 THICKNESS 7.20

UNIT C60. Weathering Character rec covered interval.

BASE OF UNIT 138.85 TOP OF UNIT 140.95 THICKNESS 2.10

UNIT C61. Weathering Character prom. Colour WS and FS lt grey. Basal Contact covered. Bedding Character irregular to planar. Bed/Lam Thickness min 1 cm, max 20 cm. Sedimentary Structures desiccation breccia and polygonal mud cracks 10 to 30 cm across. Composition calc dolostone. C61 Sample/Slab Description (taken of a desiccation breccia w/ polygonal desiccation cracks), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; polygonal desiccation cracks, composition; 69% rd intraclasts to 5 mm in size, mode 0.5 mm, intraclasts composed of microspar, 1% pyrite, 25% generally vf and f xyn dolomite between clasts, 5% interxyn porosity. Rock Name: intraclastic vf-f xyn dolostone (overall dolomitic ls). Sample C61a contains polygonal mudcracks.

BASE OF UNIT 140.95 TOP OF UNIT 142.25 THICKNESS 1.30

UNIT C62. Weathering Character semi-rec. Colour WS and FS lt grey. Basal Contact abrupt, contains a desiccation breccia and mudcracks. Bedding Character planar. Bed/Lam Thickness lam, papery, upper 6 cm is brecciated. Composition dolomitic ls, probably argil. C62 Sample/Slab Description (desiccation breccia from top 6 cm of unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; polygonal desiccation cracks, desiccation breccia/intraclasts, mm planar lam, composition; 30% rd intraclasts to 20 mm in size (3 mm mode) composed of sl dolomitic to dolomitic microspar, 40% microspar, 5% spar fills subvertical fractures and occurs between desiccation clasts, 15% vf-f xyn dolomite - concentrated in mm lams parallel bedding, also occurs preferentially between desiccation clasts, 10% porosity along bedding planes and fractures, minor interxyn porosity. Rock Name: dolomitic intramicrosparite.

BASE OF UNIT 142.25 TOP OF UNIT 142.65 THICKNESS 0.40

UNIT C63. Weathering Character semi-prom. Colour WS and FS lt grey. Basal Contact trans over 5 cm. Bedding Character laterally distorted bedding, kink bands, brecciated in places. Bed Thickness min 1 cm, max 10 cm, mode 7 cm. Composition microxyn calc dolostone w/ 2-3% thin carb lams. Sedimentary Structures chert nodules. C63 Sample/Slab/Thin Section Description (taken from top of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low-amplitude stylolites, composition; 20% micrite, 55% microspar, 10% f xyn spar in fractures, 5% vf-f xyn dolomite, replaces spar, 10% porosity along stylolites, fractures, and between xtals/gns. CL; 3% blue-luminescent fluorite after dolomite occurs preferentially inside gypsum xtal 'ghosts' and along stylolites. Rock Name: sl dolomitic/micritic and sparry microsparite.

BASE OF UNIT 142.65 TOP OF UNIT 143.15 THICKNESS 0.50

UNIT C64. Weathering Character semi-prom. Colour WS buff. FS lt greyish buff. Basal Contact abrupt planar, a 3 cm thick carb unit occurs at the contact separating C63 and C64. Bedding Character wavy (wavelength about 2.5 cm, amplitude 8 mm). Bed/Lam Thickness unbedded but lt and dk faint lams 1 mm thick contain microunconformities, lams vary in thickness laterally. Composition sl calc dolostone, gn/xtal size max 0.3 mm, mode 0.2 mm. Chert nodules (fractured) m grey-3 cm abu, 1 cm long, 3 cm thick. Sedimentary Structures chert nodules. C64 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; lt olive-brown (10YR 6/3), composition; 20% f-m xyn spar, fills dolomite-lined fractures, 50% vf-f xyn dolomite is mainly cloudy and inclusion-rich, dolomite also occurs in sparry areas and lines fractures and vugs, 30% of the porosity is interxyn. CL; 5% bright orange-luminescent overgrowths on spar, otherwise the sample is very dull red luminescent. Rock Name: sparry (f xyn) vf xyn dolostone.

BASE OF UNIT 143.15 TOP OF UNIT 143.45 THICKNESS 0.30

UNIT C65. Weathering Character prom. Colour WS buff. FS lt buff. Basal Contact wavy. Bed/Lam Thickness min 1 cm, max 12 cm, mode 4 cm, bed thickness varies laterally. Sedimentary Structures 10 cm-long irregularly shaped elongate, rd chert nodules 10 cm long. C65 Sample/Slab/Thin Section Description (taken from bedded chert nodule zone 40 cm abu), fresh surface colour; wk xlt yellowish orange (10YR 8/2) and lt grey, sedimentary structures; lt grey chert nodule 10 by 5 cm, elongate parallel to bedding, misc; fracture cuts both dolostone and chert nodule, composition; 20% elongate intraclasts, 15% microspar and f xyn spar, chert nodule contains relict mainly vf xyn texture of dolomite, 50% mainly inclusion-rich vf xyn dolomite, minor limpid f xyn dolomite lines vugs and fractures, f-m xyn spar fills vugs and fractures, 15% porosity between xtals, along fractures, and partly as intraclast moulds. CL; tr blue-luminescent fluorite after dolomite, silicified fossils are non-luminescent, otherwise chert generally luminesces very dull red. Rock name: chert nodular/microsparitic/ intraclastic vf xyn dolostone.

BASE OF UNIT 143.45 TOP OF UNIT 144.05 THICKNESS 0.60

UNIT C66. Weathering Character semi-prom. Colour WS and FS m grey. Basal Contact abrupt, wavy (wavelength 20 cm, amplitude 1 cm). Bedding Character wavy. Bed/Lam

Thickness 1 mm thick but very indistinct. Composition calc dolostone, microxyn, 3% carb film. C66 Sample/Slab/Thin Section Description (taken from upper half of unit), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; minor low-amplitude stylolites, wavy bedding (wavelength 2 cm, amplitude to 1 cm), 65% peloids (composed of microspar), range 50-150 μ m, mode 100 μ m, 20% microspar, 5% f xyn spar between peloids and along fractures, 1% fibrous chalcedony spherules (length-slow), some concentric lams are very porous, 2% vf xyn dispersed dolomite, 7% porosity, (especially high near stylolites and fractures). CL; tr blue-luminescent fluorite after dolomite xtals, overall a very dull orange-red luminescence w/ the exception of bright orange-luminescence along stylolites and numerous subvertical 'hairline' fractures. FLUOR; tr zonation of vug-filling spar. Rock Name: sl sparry pelmicrosparite.

BASE OF UNIT 144.05 TOP OF UNIT 144.20 THICKNESS 0.15

UNIT C67. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt, planar. Bedding Character dominantly planar, sl wavy. Bed/Lam Thickness min 4 mm, max 2 cm, mode 8 mm. Composition dolostone, gn/xtal size 0.1 mm mode, chert bed occurs 20 cm abu, also sl vuggy, spar to 4 mm in size lines vugs. Sedimentary Structures bed contains dk grey chert nodules 13 cm long by 3 cm thick, elongate parallel to bedding, sbdd, lams not destroyed, m to dk grey, irregular. C67 Sample/Slab Description fresh surface colour; wk xlt yellowish orange (10YR 8/2), sedimentary structures; vugs, 5% f-c xyn vug-lining spar, 80% aphan/vf xyn dolomite, 15% interxyn porosity. Rock Name: sl sparry aphan to vf xyn dolostone. C67a Sample/Slab/Thin Section Description fresh surface colour; wk xlt yellowish-orange (10YR 8/2) w/ grey to dk grey chert nodules, sedimentary structures; lt grey chert nodule, wavy lam of dolomite, nodule is subparallel bedding and cuts across wavy lam (wavelength 6 cm, amplitude 1 cm), 5% spar to 200 μ m in size, 1% pyrite to 200 μ m in size within the periphery of the chert nodule, quartz replaces spar along interxyn boundaries near chert nodule, misc; chert replaces dolomite, 20% aphanoxyn inclusion-rich dolomite, 55% vf xyn inclusion-rich dolomite, 5% vf-f xyn clear dolomite lines vugs that are filled w/ spar, 15% interxyn porosity in dolomite. CL; chert is interlam very dull red and non-luminescent, tr bright orange-luminescent spar. Rock Name: sl sparry, cherty vf xyn dolostone.

BASE OF UNIT 144.20 TOP OF UNIT 145.30 THICKNESS 1.10

UNIT C68. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact abrupt wavy, probably stromatolitic (wavelength 45 cm, amplitude 4 cm). Bedding Character very sl wavy, 15 cm abu there is a zone which may be a desiccation breccia, desiccation cracks directly above these, excellent bedding plane parting. Bed/Lam Thickness min 1 cm, max 10 cm, mode 3 cm, 1 mm thick lams, lt and dk bands follow bedding planes, brecciated in places. Composition microxyn dolomitic ls, clasts to several cm in size, desiccation cracks occur in outcrop. Sedimentary Structures poorly developed polygonal desiccation cracks just above breccia, polygons 8 cm across. Misc excellent bedding plane parting. C68 Sample/Slab Description (taken of polygonal desiccation cracks, unoriented sample 0.4 m abu), fresh surface colour; lt olive-brown (10YR 6/3), composition; 55% intraclasts, tr pyrite, 35% vf xyn dolomite, 5% f xyn dolomite, 5% interxyn porosity. Rock Name: microsparitic intraclasts in a vf xyn dolomite 'matrix'.

BASE OF UNIT 145.30 TOP OF UNIT 146.10 THICKNESS 0.80

UNIT C69. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact abrupt, very sl wavy. Bedding Character planar, sl wavy, in part irregular. Bed/Lam Thickness min 3 cm, max 10 cm. Composition calc dolostone, 0.2 mm carb parting is well developed. Sedimentary Structures high-amplitude stylolites. C69 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; high-amplitude stylolites (to 2 mm), composition; 10% stick bryozoan frags, 1 brach frag, 85% peloids and peloid aggregates, peloids range from 25-200 μ m in size and have a 100 μ m mode, 20% f and m xyn spar, tr pyrite, misc; bryozoans are cigar-shaped to 8 mm long by 2 mm wide, zoecia are filled w/ spar, 5% vf and f xyn dolomite preferentially near stylolites, interxyn porosity is especially high near stylolites and fractures. CL; 1%

blue-luminescent fluorite after dolomite occurs mainly in dasyclad algae, 2% bright orange luminescent overgrowths on spar along subvertical fractures and in dasyclad algae. Rock Name: sl dolomitic/stick bryozoan pelsparite. C69a Sample/Slab Description (contains 'worm tubes'), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; high-amplitude stylolites to 2 mm, accentuated by black residue to 125 μ m thick, composition; 1 brach valve, 2 'worm(?) tubes' to 40 mm long and 2 mm in diameter, 64% peloids (composed of microspar), 25% spar, 1% dolomite, 10% interxyn porosity. Rock Name: pelsparite.

BASE OF UNIT 146.10 TOP OF UNIT 146.30 THICKNESS 0.20

UNIT C70. Weathering Character semi-prom. Colour WS and FS buff. Basal Contact abrupt, wavy, (wavelength 10 cm, amplitude 1 cm). Bedding Character wavy irregular, crackle breccia. Bed/Lam Thickness min 2 cm, max 4 cm, mode 3 cm. Composition very sl calc dolostone, gn/xtal size 0.3 mm. C70 Sample/Slab/Thin Section Description (taken from middle of unit), fresh surface colour; wk vlt/yellowish orange (10YR 7/2), misc; many fractures, 30% f-c xyn spar fills fractures and space between clasts, dolomite consists of inclusion-rich and poor dolomite, clear dolomite is vf-f xyn and lines spar-filled vugs, 15% porosity between xtals and clasts, 55% breccia clasts larger than 2 mm in size are composed of porous (20%) aphanoxyn (10%) and vf xyn (45%) dolomite. CL; 1% blue-luminescent clear fluorite after dolomite is concentrated between breccia clasts. 3% bright orange-luminescent and zoned calcite overgrowths on clear non-luminescent spar cores. Dolomitic clasts have a 'cloudy' dull pink luminescence. Rock Name: sparry vf xyn dolostone 'clast' f-m xyn 'matrix' crackle breccia.

BASE OF UNIT 146.30 TOP OF UNIT 146.50 THICKNESS 0.20

UNIT C71. Weathering Character semi-prom. Colour WS mottled white and m brownish-grey. FS m grey. Basal Contact wavy, irregular (wavelength 20 cm, amplitude 2 cm). Composition microxyn calc dolostone. Sedimentary Structures high-amplitude stylolites immediately abu; Misc; rock is well indurated. C71 Sample/Slab/Thin Section Description (taken from base of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; high-amplitude stylolites to 3 mm, accentuated by dk grey residue to 50 μ m thick, composition; 15% m calcarenite-sized (300 μ m mode) ooids and superficial ooids, 1 stick bryozoan frag, 25% peloids range in size from 25 to 150 μ m (mode 50 μ m), 9% micrite, 20% microspar, 25% f-c xyn spar, 1% dispersed vf xyn dolomite, 5% porosity along stylolites, fractures and xtals/gns. CL; 1% bright orange-luminescent zoned overgrowths on clear spar in vugs and subvertical fracture-filling veinlets. Peloids have a 'cloudy' dull pink luminescence and spar between peloids is non-luminescent. Rock Name: coated gn microsparitic pelsparite.

BASE OF UNIT 146.50 TOP OF UNIT 146.65 THICKNESS 0.15

UNIT C72. Weathering Character rec covered interval.

BASE OF UNIT 146.65 TOP OF UNIT 149.65 THICKNESS 3.00

The top of C72 is taken as the contact between the upper and lower members of the Cape Crauford Formation.

UNIT C73. Weathering Character semi-prom. Colour WS and FS mottled buff and m brownish grey. Basal Contact covered. Bedding Character mottle pattern parallels bedding and is possibly due to bioturbation. Bed/Lam Thickness min 8 cm, max 16 cm, mode 10 cm. Composition dolostone, 5-10% vugs concentrated along bedding planes (3 cm long, 2 cm high and filled w/ white dolomite). Sedimentary Structures very minor wavy structures. Misc very well indurated, note this unit is similar to the mottled unit at the base of the section. C73 Sample Description fresh surface colour; lt brownish olive (2.5Y 6/3), sedimentary structures; mottles to 2 cm in size, vugs where parts of some mottles have been dissolved, composition; minor undifferentiated shell frags, 2% f-m xyn spar, 78% m xyn dolomite (100 μ m mode) has cloudy cores and clear rims, 20% sample porosity as 5% vugs (to 1 cm in size) and 15% between xtals (high near stylolites and fractures). CL; a very dull 'cloudy' orange-red

luminescence w/ the exception of some clear ostracod-filling dolomite which has bright luminescent and zoned xtals. FLUOR; com zoned dolomite. Rock Name: vuggy/mottled f-m xyn dolostone.

BASE OF UNIT 149.65 TOP OF UNIT 151.95 THICKNESS 2.30

UNIT C74. Weathering Character rec covered interval.

BASE OF UNIT 151.95 TOP OF UNIT 157.65 THICKNESS 5.70

UNIT C75. Weathering Character semi-prom. Colour WS and FS buff and m brownish grey. Basal Contact covered. Bedding Character indistinct. Bed/Lam Thickness min 8 cm, max 20 cm, mode 15 cm. Composition dolostone. Fossils sparse ossicles and 1 poorly preserved orthocone frag (3 cm long, 2 cm across). C75 Sample/Slab/Thin Section Description (taken 1.25 m abu, contains an orthocone frag), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; mottles, vugs to 1 cm, composition; 22% fossils (dolomitic) consist of 2% ossicles, one 4 cm long frag of an orthocone siphuncle, 20% articulated ostracods to 1 mm in size (25µm thick valve), 1 bryozoan frag, 3% f-m xyn spar fills fractures and some vugs, total 55% f xyn dolomite, some of which has clear rims and inclusion-rich cores, 5% clear dolomite fills ostracods, and lines vugs and fractures. 20% sample porosity (5% vugs to 1 cm in size and 15% porosity between xtals). CL; 10% bright multi-fold zoned orange-luminescent overgrowths on limpid dolomite in ostracods and subvertical fractures. Otherwise, the sample has a dull orange-red 'cloudy' luminescence. Rock Name: vuggy ostracodal f xyn dolostone.

BASE OF UNIT 157.65 TOP OF UNIT 159.40 THICKNESS 1.75

UNIT C76. Weathering Character rec covered interval.

BASE OF UNIT 159.40 TOP OF UNIT 160.00 THICKNESS 0.60

UNIT C77. Weathering Character prom. Colour WS and FS mottled buff and lt brownish grey, orange weathering minor, tr green weathering (malachite?). Basal Contact covered. Bedding Character mottle elongation is parallel to bedding. Composition dolostone, 10% subequant vugs to 2 cm in size. Misc extensively fractured.

BASE OF UNIT 160.00 TOP OF UNIT 163.00 THICKNESS 3.00

UNIT C78. Weathering Character prom. Colour WS and FS buff. Basal Contact trans over 0.5 m into an unmottled unit. Bedding Character small wavy structures 3 by 3 cm, sl convex up. Composition dolostone. Fossils very poorly preserved corals and 5% ossicles. C78 Sample/Slab/Thin Section Description (taken from base of unit), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; vugs, composition; 5% dolomitic stromatoporoid (1 frag 15 by 5 mm), 1 ossicle and echinoderm-plate frag, tr spar, 1% bitumen fills vugs, tr malachite staining, 71% m xyn inclusion-rich dolomite (mode 125µm), 3% clear f-c xyn dolomite lines fractures, some rhombs have alternating inclusion-rich and poor zones, 20% sample porosity (consists of 5% vugs to 0.5 mm in size and 15% along stylolites and between xtals/gns). CL; dull orange-luminescence, clear overgrowths on dolomite are mainly non-luminescent but there are areas w/ thin moderate orange-luminescent clear overgrowths (5%). FLUOR; pervasive complexly-zoned dolomite. Rock Name: vuggy fossiliferous m xyn dolostone.

BASE OF UNIT 163.00 TOP OF UNIT 170.50 THICKNESS 7.50

UNIT C79. Weathering Character rec. Basal Contact obscured. Bedding Character massive. Composition calc dolostone. C79 Sample/Slab/Thin Section Description (of litho and concretion), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; dk brown spherical concretionary structure to 4 cm in size, central part is powdery-white carbonate, half of thin section is of 'concretion', 24% fossils (dolomitic), comprises 2% ossicles, one plicated brach(?) frag (inside concretion), 2% stromatoporoids (inside 'concretion'), 20% undifferentiated shell frag moulds, 1% dispersed f xyn spar, spar also lines stylolites and fractures, tr pyrite, tr chert concretion, contains better preserved shell frags, 55% m xyn dolomite, 30-125µm, 70µm mode, dolomite in 'concretion' is vf xyn (10µm

mode), in porous areas dolomite has clear rims and some rhombs are corroded, 20% sample porosity consists of 5% undifferentiated shell frag moulds, especially in 'concretion', 5% fracture/stylolite porosity, and 10% interxyn/interclast porosity. CL; dolomite generally luminesces dull pink and chert is non-luminescent. There are, however, moulds of ossicles in the chert that are filled w/ zoned brightly luminescent dolomite. Rock Name: concretionary fossiliferous m xyn dolostone. C79a Sample/Slab/Thin Section Description (of 10 cm-wide 'concretion'), fresh surface colour; vlt orangy-yellow (2.5Y 7/3), sedimentary structures; chert nodule to 10 by 5 cm, composition; 38% silicified intraclasts (silicified microspar), 5% articulated ostracods to 700µm in size, 1% sponge(?) spicules, 1 gastropod, and 1 stick bryozoan frag, 19% silicified microspar, 15% silicified spar, tr pyrite just inside the boundary of the chert nodule, xtals to 125µm, oxidized, 2% bitumen, 79% chert (subequant quartz xtals mainly 10µm in size, preserves carbonate textures), 20% porosity along stylolites and between xtals. CL; overall dull red luminescence w/ the exception of non-luminescent spar between peloids and 1% zoned orange-luminescent spar filling vugs. FLUOR; large white fluorescent dolomite xtals. Rock Name: chert nodule consists of silicified ostracod-bearing sparry intramicrosparite.

BASE OF UNIT 170.50 TOP OF UNIT 170.70 THICKNESS 0.20

D. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION D, PORT BOWEN, MEASURED IN 1982.

Locality: North Shore Port Bowen.

Latitude: 73°13'45"N.

Longitude: 88°56'30"W.

Base of section D is within member B of the Baillarge Formation, 24.5 m asl.

The start of section D is 13.3 km SW of section A, 10.8 km SW of section B and 11.2 km SW of section C. Base camp is at lat. 73°14'26"N, long. 89°01'36"W.

UNIT D1. Weathering Character semi-prom. Colour WS and FS mottled buff and m to dk grey (mottles 2 cm in size). Basal Contact covered. Bedding Character wavy irregular. Bed/Lam Thickness min 7 cm, max 30 cm, mode 15 cm. Composition dolostone w/ laterally discontinuous carb films 1 to 2 cm long and 0.3 mm thick, homogeneous composition throughout. 1.5 m abu mottles are replaced by dk grey and black chert (very minor % of outcrop). Vugs (3-5%, most <1 cm in size) are associated w/ dissolution of fossils, vugs lined w/ dolomite xtals to 2 mm in size. Sedimentary Structures rare limonitic nodules (may be replaced chert nodules). Mottles become larger 2 m abu and less distinct 2.5 m abu. Sl greenish weathering at bed contacts, tr residue along stylolites. Fossils basal 1 m contains 5-10% fossils including 1% stromatoporoids (7 cm by 5 mm) which weather buff. Orthocones 8 cm long w/ sutures occur 1.5 m abu. Brach (1%) fauna (including spiriferid forms) occurs in the vicinity of orthocones. Ostracod moulds of disarticulated convex-up valves, 2-3 mm across. Colonial coral occurs 30 cm above orthocone zone. At this level there is a faunal change into gastropod-rich beds. Three gastropod long-axes are perpendicular to bedding, two have long axes parallel to bedding. Nine gastropods in a 30 by 20 cm square area. 20-30% fossils 2.5 m abu. Gastropods w/ solitary corals 2.75 m abu. Cross-section of coral is 1.5 cm across, 40% fossils consist of gastropods, brachs and undifferentiated fossil frags. Misc very well indurated. D1 Sample/Slab/Thin Section Description (of stromatoporeid 0.7 m abu), fresh surface colour; mottled lt olive-brown (10YR 6/3) and wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude wispy stylolites, vugs, irregularly-shaped mottles. 5% dispersed ossicles, 3% undifferentiated shell frags, 3 articulated ostracods, and 1 dk brown 3-dimensional graptolite frag, tr m xyn spar, tr malachite staining, tr pyrite to 1.5 mm in size, irregularly-shaped xtal aggregates, tr bitumen in vugs, 2% interxyn brown insoluble mat'l, total 73% dolomite, consists mainly of 70% inclusion-rich f xyn dolomite (50µm mode), 3% clear f-c xyn dolomite lines vugs, inclusion-rich dolomite has intergrown xtals,

corrosion of dolomite is com especially in porous dolomitic mottles, 25% interxyn sample porosity preferentially occurs in the lt olive brown mottles. CL; limpid dolomite lining vugs is non-luminescent, tr clear spar filling vugs is zoned orange-luminescent. Overall, dolostone luminesces very dull red. Rock Name: mottled fossil-bearing f xyn dolostone. D1a Sample Description (taken 2.4 m abu), mottled dolostone, contains a spiriferid f costate brach 24 mm wide. D1b Sample/Slab/Thin Section Description (taken 2.6 m abu from gastropod-rich zone), fresh surface colour; mottled lt olive-brown (10YR 6/3) and m olive-brown (10YR 5/2), sedimentary structures; wispy low-amplitude stylolites are accentuated by 1% brown insoluble residue, composition; 17% fossils (dolomitic), consist of 2% favositid coral frags to 20 mm in size, 10% brach frags, 5% articulated ostracods to 2.5 mm in size and 5% ossicles, 2% f xyn spar, tr pyrite, 1% interxyn bitumen, 66% inclusion-rich f xyn dolomite (35 μ m mode) is corroded in porous dolomitic areas, 5% clear dolomite lines and partly fills some vugs, spar fills the remainder, 1 ossicle has a dolomite overgrowth. 25% sample porosity is distributed as 15% between xtals/gns and 10% as moulds (especially dissolved articulated ostracods). CL; generally non-luminescent, however, non-luminescent limpid dolomite-lined vugs are filled w/ zoned spar. Rock Name: mottled sl sparry/fossiliferous f xyn dolostone. D1c Sample/Slab/Thin Section (contains a moderately well-preserved gastropod), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; low-amplitude stylolites, 5% ossicles, 10% ostracods to 1.5 mm in size, 3% f xyn spar, 1% bitumen, 3% residue between and within xtals and along stylolites, 53% inclusion-rich f xyn dolomite, 2% clear dolomite lines spar-filled fractures, 25% porosity (5% mouldic and fracture porosity, and 20% interxyn). CL; tr vugs are lined w/ non-luminescent limpid dolomite and filled w/ bright orange-luminescent spar. Otherwise the sample luminesces a very dull orange. Rock Name: sl sparry fossiliferous f xyn dolostone. D1d Sample/Slab Description (taken 2.6 m abu), fresh surface colour; mottled lt olive-brown (10YR 6/3) and m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 15% fossils (dolomitic) consist of a colonial coral, 5% ostracods to 3 mm in size, 5% cup corals to 2 cm diameter, 5% ossicles. 1% spar occurs between the septa of a cup coral and fills an articulated ostracod lined w/ clear dolomite, 1% interxyn bitumen, 78% f xyn dolomite (50 μ m mode), 20% porosity between xtals/gns and minor moulds of articulated ostracods. Rock Name: fossiliferous f xyn dolostone.

BASE OF UNIT 0.00 TOP OF UNIT 3.25 THICKNESS 3.25

UNIT D2. Weathering Character semi-prom. Colour WS buff w/ lt brownish grey irregular patches. FS m brown. Basal Contact trans over 10 cm. Bedding Character one large algal head, ripple marks (cross-lam) below and between heads, ripple crests strike 115°. Bed/Lam Thickness min 2 cm, max 25 cm. Composition dolostone, microxyn, stromatolitic. Sedimentary Structures cross-lam, crests trend 115°. Fossils orthoconic nautiloids occur at D2 base, long axes are randomly oriented along bedding. D2 Sample/Slab Description (taken of underlying cross-lam unit, contains abundant bitumen and carb lams), fresh surface colour; overall lt olive-brown (10YR 6/3), sedimentary structures; low-amplitude stylolites accentuated by dk brown residue, misc; minor fractures, composition; tr ossicles, 50% peloid ghosts, 1% f xyn spar fills veins, 1% bitumen lines fractures, 73% dolomite (f-m xyn) of 2 types, clear and inclusion-rich in a clotted texture, perhaps originally pelsparite, 25% interxyn porosity. Rock Name: f-m xyn dolostone.

BASE OF UNIT 3.25 TOP OF UNIT 3.65 THICKNESS 0.40

UNIT D3. Weathering Character rec covered interval.

BASE OF UNIT 3.65 TOP OF UNIT 3.75 THICKNESS 0.10

UNIT D4. Weathering Character semi-rec to semi-prom. Colour WS m brownish w/ dk brownish lams. FS aa but sl darker. Basal Contact covered. Bedding Character dominantly planar, minor cross-lams and minor wavy lam. Bed Thickness min 2 cm, max 11 cm, lams dk grey, 2 mm thick, m brown lams dominant, 5 mm thick lt lams are laterally continuous for 40 cm. Composition dolostone, 3 cm-sized vugs filled w/ 1 mm-sized spar, subvertical fractures lined w/ dk grey residue, 5% carb, possibly bitumenous, intraformational conglomerate bed

10 cm thick and 30 cm long (a local occurrence), clasts 8 cm by 4 mm. D4 Sample/Slab/Thin Section Description (contains dk bitumenous(?) mat'l on fracture surfaces, near upper contact spar lines fracture), fresh surface colour; overall wk m olive-brown (10YR 5/2), sedimentary structures; cross-lam, sets to 3 cm thick, 1% fracture-filling spar and spar between dolomite xtals, 5% shiny black brittle bitumen fill fractures and space between clasts/xtals, 2% inclusions in dolomite xtals, 1% pyrite, total 68% f xyn dolomite (mode 50 μ m gn/xtal size), minor isolated clear dolomite within coarser fracture-filling spar, this clear dolomite is in part calcified. Total 25% porosity, some lams much more porous than others due to dissolution of spar, including calcified dolomite. CL; tr bright orange-luminescent zoned spar as minor subvertical veinlets. Otherwise, the sample luminesces a very dull red. Rock Name: cross-lam c calcilutite-sized sl bitumenous f xyn dolostone. BASE OF UNIT 3.75 TOP OF UNIT 5.05 THICKNESS 1.30

UNIT D5. Weathering Character semi-prom. Colour WS and FS mottled as in D1. Basal Contact trans over 10 cm, planar. Bedding Character mottles are elongate parallel to bedding. Composition calc dolostone, fossiliferous, coaly bitumen fills corallites. Sedimentary Structures mottles. Fossils 1% generally broken colonial coral frags, 1% brachs (modal size 15 mm). D5 Sample/Slab Description (taken 3 cm abu), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; stylolites, composition; 15% favositid coral frags (dolomitic), tr spar fills corallites and fractures, 5% shiny black bitumen fills corallites of colonial coral, 60% f xyn dolomite (50 μ m mode), 20% interxyn sample porosity. Rock Name: sl bitumenous/fossiliferous f xyn dolostone. D5a Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; minor low-amplitude stylolites, composition; 10% ostracod valves, 10% undifferentiated shell debris, 1% ossicles, tr turretellid gastropods, 1 conodont in thin section, 1% microspar and 2% f xyn spar in gastropods and articulated ostracods, 1% bitumen between xtals and lining vugs, tr pyrite, 65% f-m xyn dolomite (mode 50 μ m), m xyn clear dolomite rhombs in some ostracods the space between which is filled w/ spar, some dolomite rhombs have clear rims and inclusion-rich cores, est 2% clay-sized inclusions in dolomite, 25% porosity (20% between xtals and 5% in articulated ostracod moulds), in porous dolomitic areas dolomite rhombs are corroded and in part dissolved. CL; non-luminescent except for bright orange-luminescent clear spar filling a gastropod(?). Limpid dolomite in gastropod is non-luminescent. Rock Name: mottled sl sparry/fossiliferous f-m xyn dolostone. BASE OF UNIT 5.05 TOP OF UNIT 5.35 THICKNESS 0.30

UNIT D6. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact trans over 5 cm, very sl wavy. Bedding Character very low-angle tangential cross-lams throughout unit, very thin cosets, possibly wavy lam. Bed/Lam Thickness min 1 cm, max 13 cm, mode 8 cm, laterally continuous. Composition dolostone, also contains fractures w/ carb linings. Note intraclasts and peloids occur in the lower 10 to 12 cm. Intraclast size 2-25 cm, elongate parallel to bedding. Sedimentary Structures low-angle tangential cross-lams throughout. D6 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; planar lam, low-amplitude stylolites, 1% shell frags, 3% f-c interxyn/fracture-filling spar, 5% interxyn bitumen, tr pyrite, 69% f-m xyn (70 μ m mode) dolomite, rhombs are com partly dissolved in porous lams, dolomite w/ clear rims and inclusion-rich cores to 300 μ m in size line f-c xyn clear spar-filled moulds, 25% interxyn porosity, some lams much more porous than others. CL; non-luminescent except for bright orange-luminescent spar in a vug. Spar and dolomite lining the vug is non-luminescent. Rock Name: mottled sl bitumenous f to m xyn dolostone (probably a f gn dolarenite). D6a Sample/Slab/Thin Section Description fresh surface colour; m olive-brown (10YR 5/3), coated gns are different sizes in different lams, composition; 55% single and multiple nucleated coated gns (probably ooids), 1 gastropod, 2 brach shell frags, 5% spar-1 patch of spar 35 by 8 mm thick (c xyn in cores), elongate parallel to bedding, fractures filled w/ spar, 1% bitumen, 25% f xyn inclusion-rich dolomite between coated gns, mode of dolomite rhombs is 25 μ m, clear dolomite (to c xyn) lines spar-filled vugs, dolospar between coated gns is cloudy white compared w/ lt brown coated gns. Calcification of

dolomite is com along spar-filled fractures. This, combined w/ corroded and partly dissolved dolomite rhombs between coated gns in porous areas suggests dissolution of calcified dolomite as the cause of the high porosity. CL; non-luminescent except for subvertical hairline fractures. FLUOR; zoned spar. Rock Name: sl sparry coated gn f xyn dolostone.
BASE OF UNIT 5.35 TOP OF UNIT 6.35 THICKNESS 1.00

UNIT D7. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact trans over 5 cm, planar. Bedding Character locally mottled, unbedded. Bed/Lam Thickness <1 to 2 cm, 5% irregular carb lams. Composition dolostone. Fossils 2 brachs (see sample), minor corals. Sample D7, 2 poorly preserved brachs (1%), not well preserved, 1% corals. D7 Sample/Slab Description fresh surface colour; mottled lt olive-brown (10YR 6/3) and vwk dk olive-brown (10YR 4/1), sedimentary structures; mottles and low-amplitude stylolites, composition; 1 turretelid gastropod 8 mm long, 5% poorly preserved brach frags, some f costate, tr spar between dolomite xtals, 79% f-m xyn dolostone (mode 50 μ m), 15% interxyn porosity. Rock Name: mottled fossil-bearing f-m xyn dolostone.
BASE OF UNIT 6.35 TOP OF UNIT 6.52 THICKNESS 0.17

UNIT D8. Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact sl wavy, trans over 5 cm. Bedding Character irregular in 3 dimensions. Bed/Lam Thickness <1 cm to 2 cm, 5% carb irregular lams, flaggy bedding plane parting throughout unit. Composition calc dolostone, carb, microxyn, fractures lined w/ white dolomite, no bitumen. Intraclasts at base and locally through unit. D8 Sample/Slab/Thin Section Description (highly carb and possibly argil), fresh surface colour; wk xdk olive-brown (10YR 2/2), sedimentary structures; low-angle cross-lam, 20% microspar, 67% f xyn spar, 1 lamina is entirely f xyn spar, another has microspar clasts in f xyn 'matrix', 2% spar fills dolomite-lined 1 cm-sized vugs, however 1 vug along stylolite is lined w/ spar and filled w/ dolomite, 1% bitumen, tr pyrite, 5% vf and f xyn dolomite, clear c xyn dolomite to 0.8 mm lines vugs, calcification of dolomite is com, 5% porosity along stylolites and between xtals/gns. CL; dolomite luminesces dull red, calcite is mainly non-luminescent except for bright orange-luminescent spar filling subvertical fractures (invisible in ordinary light). Rock Name: cross-lam sl dolomitic microsparitic f xyn sparite.
BASE OF UNIT 6.52 TOP OF UNIT 6.77 THICKNESS 0.25

UNIT D9. Weathering Character semi-prom. Colour WS and FS m brownish-grey. Basal Contact abrupt planar. Bedding Character massive. Composition dolostone, chert nodules (3 cm thick, 7 cm long, elongate parallel to bedding) 30 cm abu, nodules dk grey and lensoidal to sbdr, visible porosity in corallites, many of which are filled w/ black, brittle, bitumen (5%). Sedimentary Structures chert nodules. Fossils 20-30% favositid corals, bitumen fills some broken corals. D9 Sample/Slab/Thin Section Description (colonial coral filled w/ bitumen), fresh surface colour; mottled lt olive-brown 10YR 6/3 and 10YR 5/0, sedimentary structures; low-amplitude stylolites, composition; 26% fossils (dolomitic), 20% favositid corals to 8 cm in size, in and out of place, 1% *Catenipora*, 4% ossicles, 1% ostracods(?), tr stromatoporoids, 5% f xyn spar between dolomite rhombs, 8% bitumen between dolomite xtals and filling corallites, bitumen does not fill secondary corroded dolomite porosity. Articulated ostracods (to 3 mm in size) and corallites are filled in part w/ polyxyn quartz (10% spherulitic chalcedony). Polyxyn quartz also replaces corallite walls. Tr pyrite, 36% f xyn dolomite is com, extensively corroded but bitumen does not fill this pore space in remnant sparry dolomitic areas, minor calcification of dolomite, petrographic relations suggest corallites were dolomitized, then in part silicified(?), then calcified, then filled w/ bitumen, then the spar was removed to create secondary porosity and the dolomite was corroded, 25% porosity. CL; non-luminescent w/ the exception of less than 1% bright orange-luminescent calcite overgrowths on spar lining corallites. FLUOR; minor fluorescent dolomite. Rock Name: fossiliferous/sl bitumenous/sl sparry f xyn dolostone. D9a Sample/Slab/Thin Section Description (of large favositid coral and stromatoporoids), fresh surface colour; mottled lt olive-brown (10YR 6/3) and grey (10YR 5/2), sedimentary structures; minor low-amplitude stylolites, composition; 33% fossils, 30% favositid corals, one specimen on its side is at least 18

cm in size (sampled), an in-place 7 cm wide colonial coral w/ 0.5 mm-sized corallites, 1% ossicles, 2% stromatoporoids, tr *Catenipora*, 5% spar (to c xyn) fills corallites, 10% shiny black bitumen and 3% polyxyn quartz fills some corallites, minor fibrous chalcedony replaces corallites, 34% f xyn dolomite (40 μ m mode) (excludes dolomitized fossils), clear dolomite to 150 μ m lines spar-filled vugs, colonial coral walls are composed of vf xyn dolomite, in porous areas dolomite has inclusion-rich cores and clear rims, dolospar fills corallites, 3% brown clay-sized inclusions, dolomite is corroded in porous areas. 15% sample porosity (includes 5% ostracod? moulds and empty corallites). CL; non-luminescent except for bright orange-luminescent spar filling corallites. Spar lining corallites and limpid dolomite are non-luminescent. FLUOR; minor zoned fluorescent dolomite. Rock Name: bitumenous/sl sparry/ fossiliferous f xyn dolostone. D9b Sample/Slab/Thin Section Description (rep litho sample), mottled lt olive-brown (10YR 6/3) and grey (10YR 5/0), sedimentary structures; minor low-amplitude stylolites, composition; 19% fossils (dolomitic), consist of 2% ossicles, 2% *Catenipora* frags, 5% tabular stromatoporoids 60 by 4 mm, 10% favositid corals, tr articulated ostracods. 2% polyxyn quartz fills corallites, tr fibrous chalcedony replaces corallite walls, 5% fills corallites and pores of stromatoporoids, 15% shiny black and brittle bitumen, mainly in corallites and in interxyn pores, tr pyrite, tr chert (*Catenipora* in part chert), 48% f xyn (50 μ m mode) dolomite, clear dolomite lines vugs that are filled w/ 3% spar, dolomite is corroded in porous zones, ossicles have dolomite syntaxial overgrowths, 15% porosity between xtals/gns and in corallites, pores of stromatoporoids and vugs. Rock Name: bitumenous/sl sparry/fossiliferous f xyn dolostone.

BASE OF UNIT 6.77 TOP OF UNIT 7.77 THICKNESS 1.00

The base of unit D10 is taken as the top of member B of the Baillarge Formation.

UNIT D10. Weathering Character rec covered interval.

BASE OF UNIT 7.77 TOP OF UNIT 12.07 THICKNESS 4.30

UNIT D11. Weathering Character semi-prom. Colour WS m brownish grey. FS m brown. Basal Contact covered. Bedding Character f lam, sl wavy. Bed/Lam Thickness min 2 cm, max 10 cm, mode 5 cm, lams dk grey, 0.3 to 1 mm thick, laterally discontinuous over 3 cm, wispy character. Composition dolostone, uniform gn size <0.1 mm. D11 Sample/Slab/Thin Section Description (taken 60 cm abu), fresh surface colour; m olive-brown (10YR 5/3), tr f xyn spar in rd concretion or clast, 1% pyrite in sparry dolomitic rd concretion or clast, 1% interxyn bitumen, 83% f xyn dolomite (30 μ m mode), 2% brown clay-sized inclusions in partly corroded dolomite, 15% interxyn porosity. CL; non-luminescent. Rock Name: f xyn dolostone.

BASE OF UNIT 12.07 TOP OF UNIT 12.77 THICKNESS 0.70

UNIT D12. Weathering Character semi-prom. Colour WS and FS mottled, buff and m to dk grey (2 cm-sized mottles). Basal Contact abrupt, irregular. Bedding Character mottled. Sedimentary Structures mottle size increases from 2 cm in the basal 30 cm of the unit to 4 cm in an overlying zone. The basal zone has a more random fabric and a lighter buff matrix. Above this the mottle pattern has a fabric parallel to bedding and finally there is a lam unmottled zone. Bed/Lam Thickness min 3 cm, max 20 cm, basal 20 cm may be brecciated. Composition calc dolostone, 1% carb film, laterally discontinuous, approx 2% vugs lined w/ 1 mm white spar. Sedimentary Structures mottles. Fossils ghost preservation of ossicles.

BASE OF UNIT 12.77 TOP OF UNIT 13.77 THICKNESS 1.00

UNIT D13. Weathering Character semi-prom. Colour WS and FS buff, dk grey lams. Basal Contact trans over 20 cm, planar. Bedding Character planar, sl lumpy. Bed/Lam Thickness min 7 cm, max 17 cm (only 2 beds). Composition dolostone, gn/xtal size min 0.2 mm, max 0.3 mm, 10% interxyn porosity. Sedimentary Structures minor stylolites. D13 Sample/Slab Description (taken 20 cm abu), fresh surface colour; lt olive-brown (10YR 6/3) w/ minor wk dk olive-brown (10YR 4/2) lams, sedimentary structures; low-amplitude stylolites, planar lam, composition; 5% ostracod ghosts, 5% microspar, 10% spar between dolomite rhombs and

filling tr fractures, 2% interxyn bitumen, dolomite content is variable from one lamina to another, f to m xyn (ranges from 30 to 75 μ m), vugs lined w/ m xyn clear dolomite and filled w/ spar, 20% porosity occurs between xtals/gns, also as ostracod moulds to 2 mm in size, 58% f-m xyn dolomite. Rock Name: ostracod-bearing sparry f-m xyn dolostone. Misc well indurated.

BASE OF UNIT 13.77 TOP OF UNIT 14.07 THICKNESS 0.30

UNIT D14. Weathering Character semi-prom. Colour WS and FS m brownish grey overall, dk grey lams. Basal Contact planar, trans over 5 cm. Bedding Character sl wavy, beds thicken and thin laterally over 10 cm. Bed/Lam Thickness min 0.5 mm, max 3 cm, mode 1 to 2 cm, laterally continuous, irregular and wavy in 3 dimensions. Composition dolostone, 0.2 mm uniform gn/xtal size, carb lams comprise 15% of unit, some beds to 2 cm thick are carb, tr small vugs (0.5 cm), 2 in bed 10 cm below upper contact. Sedimentary Structures contorted stratification. D14 Sample/Slab/Thin Section Description (taken from deformation zone 25 cm abu), fresh surface colour; interlam wk dk olive brown (10YR 4/2) and lt olive brown (10YR 6/3), sedimentary structures; contorted lam, composition; 5% spar between dolomite xtals, 2% dk brown interxyn mat'l, 75% f xyn dolomite (40 μ m mode), 15% interxyn porosity. CL; non-luminescent except tr bright orange-luminescent calcite. Rock name: detrital(?) sl sparry f xyn dolostone.

BASE OF UNIT 14.07 TOP OF UNIT 15.07 THICKNESS 1.00

UNIT D15. (60% lam, 40% mottled). Weathering Character semi-prom, thinly interbedded. Colour WS and FS m brownish, sl mottled in places (m to dk brown mottles). Basal Contact trans over 3 cm, planar. Bedding Character interbedded mottled planar lam, minor sl wavy areas. Bed/Lam Thickness mottled bed (min 0.1 m, max 0.5 m), lam unit thickness min 1 mm, max 20 cm, mode 5 cm, thin dk grey lams are 1 to 2 mm thick and laterally continuous over at least 30 cm. Composition dolostone, some vugs are brach moulds, 15% irregularly-shaped vugs 5 mm in size. Fossils orthoconic nautiloids 0.5 m abu, 2.3 cm long, 0.5 cm wide, concave sutures toward anterior end, also tr brach moulds (3.5 cm across), small 1 cm-sized brachs on bedding plane surface in a massive bed, ossicles occur in interlam unit. Sedimentary Structures interlam mottled and massive units, Misc very well indurated. D15 Sample/Slab/Thin Section Description (of massive bed taken near base), fresh surface colour; overall m olive-brown (10YR 5/3), sedimentary structures; high-amplitude (to 3 mm) stylolites accentuated by dull brown residue to 200 μ m thick, some fractures terminate at stylolites, in places shiny black bitumen also occurs along stylolites, composition; 5% ossicles, 1% gastropods, tr cup corals and 1 sponge spicule, tr stromatoporoids, tr ostracods, 5% undifferentiated fossil moulds, 1 conodont(?), 5% spar fills vugs and fractures, 2% shiny black bitumen between xtals/gns and com occurs in the center of dolomite-lined, spar-filled vugs (i.e., spar surrounds bitumen), some vugs are lined w/ clear dolomite xtals to 200 μ m in size and filled w/ c to vc xyn spar, 73% f xyn dolomite (30 μ m mode), dolomite rhombs partly dissolved, most is lt brown in transmitted light because of inclusions, 20% sample porosity (5% vugs, 15% between dolomite rhombs, along stylolites and fractures). CL; overall a very dull red luminescence. Rock Name: sl sparry/vuggy fossiliferous f xyn dolostone. D15a Sample/Slab/Thin Section Description (of lam unit), interlam wk m olive-brown (10YR 5/2) and wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites accentuated w/ up to 0.2 mm thick dk brown residue, 40% coated gns (probably ooids) range from 0.15 to 1.5 mm, mode 0.4 mm, now composed of vf to f xyn dolomite, some w/ concentric lamellae and a few w/ multiple nuclei, 6% fossils (dolomitic) consist of 1% ostracods, 5% ossicles, 1% microspar, 2% spar, 2% shiny black bitumen, tr spherulitic chalcedony, 77% total dolomite, limpid m xyn dolomite lines spar-filled vugs, dolomite in porous areas is com corroded, has inclusion-rich cores and clear rims. Calcification of dolomite is com in relict sparry areas, 20% porosity between xtals but mainly between coated gns, some lams more porous than others, tr coated gn mouldic porosity, also minor porosity where selective concentric lams of coated gns have been dissolved. CL; non-luminescent except for tr bright luminescent overgrowths on dolomite filling an ostracod(?). Rock Name: sl fossiliferous/coated gn vf to f xyn dolostone. Sample D15c taken 0.5 m abu contains brachs

and one orthocone.

BASE OF UNIT 15.07 TOP OF UNIT 16.77 THICKNESS 1.70

UNIT D16. Weathering Character semi-prom. Colour WS and FS m brown. Basal Contact abrupt planar over 3 m exposure. Bedding Character planar to large-scale wavy. Bed Thickness min 5 cm, max 10 cm, 5 beds in all, in part faintly lam. Composition very sl calc dolostone, intraclasts (to 8 cm by 0.5 cm), sbrd, elongate parallel to bedding. Sedimentary Structures some imbrication of large intraclasts mainly in lower 5 cm (dip of intraclasts to the south). D16 Sample/Slab/Thin Section Description (taken from lower half of unit), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; intraclasts, in part lam w/ laterally continuous carb films defining lam, composition; 35% intraclasts (to 35 mm long and elongate parallel to bedding), are composed of variable litho but mainly f xyn dolostone, rarely sparry dolostone. 2% spar, 1% bitumen, 48% f xyn dolomite (corroded in porous areas), 2% clay-sized inclusions in dolomite, tr limpid dolomite lines (and spar fills) fractures, dolomite xtals in some intraclasts have inclusion-rich cores and clear rims, 15% sample porosity is mainly interxyn and is generally higher in the intraclasts than the surrounding 'matrix'. CL; non-luminescent except for tr bright orange-luminescent spar filling vugs. Rock Name: intraclastic f xyn dolostone.

BASE OF UNIT 16.77 TOP OF UNIT 17.02 THICKNESS 0.25

UNIT D17. Weathering Character semi-prom. Colour WS and FS m brown. Basal Contact abrupt, planar. Bedding Character wispy bedding (due to deformation), dk grey parallel lams are laterally continuous over at least 10 m. Bed Thickness min 10 cm, max 30 cm. Composition microxyn dolostone, gn/xtal size <0.1 mm, carb lams comprise 10% of unit. Sedimentary Structures contorted stratification, there is a 5 cm thick intraclastic zone 1.1 m abu. D17 Sample/Slab/Thin Section Description (shows deformation and wispy lams, taken at base of unit), fresh surface colour; overall wk dk olive-brown (10YR 4/2), sedimentary structures; deformation, composition; 1% interxyn spar w/ minor calcified dolomite, 1% bitumen, tr pyrite, 3% brown residue along stylolites and between xtals, 80% f-m xyn dolomite is com corroded, probably due to dissolution of calcified dolomite, 1% est clay-sized inclusions in dolomite, 15% interxyn porosity. CL; overall a very dull red luminescence. Rock Name: intraclastic f-m xyn dolostone.

BASE OF UNIT 17.02 TOP OF UNIT 18.72 THICKNESS 1.70

UNIT D18. Weathering Character semi-prom to semi-rec (excellent exposure at waterfall). Colour WS and FS interbedded m brown and dk brownish grey. Basal Contact trans over 20 cm. Bedding Character planar, laterally very continuous, traceable for approx 70 m. Bed/Lam Thickness min 1 cm, max 15 cm, mode 4 to 5 cm, lams very faint, 70% dk grey, 30% m brown. Composition microxyn dolomitic ls. Sedimentary Structures high-amplitude stylolites. D18 Sample/Slab/Thin Section Description fresh surface colour; wk dk olive-brown (10YR 4/2). sedimentary structures; minor low-amplitude stylolites, 10% intraclasts(?) to 1.5 mm in size, elongate parallel to bedding, 82% microspar (est 2% clay-sized inclusions), 3% patches of f xyn spar, tr clear m xyn spar lines fractures, 2% insoluble interxyn mat'l, including carb flakes, 100µm-sized spar lines fractures, 1% dispersed vf xyn dolomite, some rhombs of which have clear microspar inclusions (calcification?), 2% porosity along fractures and tr along stylolites, tr interxyn porosity. CL; numerous bright orange luminescent spar overgrowths along fracture-filling spar veinlets. Rock Name: intraclastic(?) microsparite. D18a Sample/Slab/Thin Section Description fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; massive, composition; 90% microspar (est 2% clay-sized dk insoluble inclusions), f xyn spar is pseudomorphic after 2% gypsum xtals to 1 mm long, 1% spar lines fractures, 2% dispersed brown insoluble mat'l (10µm mode) between xtals, 2% dispersed vf xyn dolomite replaces microspar, 3% sample porosity (2% along stylolites, 1% between xtals). CL; non-luminescent except for tr bright orange-luminescent 'hairline' subvertical fractures and overgrowths on spar after gypsum xtals. Rock Name: microsparite.

BASE OF UNIT 18.72 TOP OF UNIT 20.72 THICKNESS 2.00

UNIT D19. Weathering Character prom, forms upper ledge of waterfall. Colour WS rusty surface stain. FS m brown. Basal Contact trans over 0.5 m. Bedding Character dominantly planar irregular (stylolites), fractured. Composition dolomitic ls breccia, residue along high-amplitude stylolites and lining joint surfaces, tr dk grey 4-cm-long chert nodules are elongate parallel to bedding. Sedimentary Structures high-amplitude stylolites are accentuated by residue. Misc extensively fractured. A monocline occurs just south of the waterfall w/ 5' apparent dip to north. D19 Sample/Slab/Thin Section Description (taken 0.5 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; high-amplitude (to 7 mm) stylolites are accentuated by dull black residue to 50 μ m thick, in some cases stylolite-bounded clasts have been rotated at right angles to bedding resulting in stylolites at right angles to bedding, 88% microspar w/ est 3% clay-sized inclusions, tr spar along stylolites, tr monoxyn quartz, some w/ bitumen(?) inclusions, 2% brown residue along stylolites, 5% f-c xyn dolomite, especially near or along stylolites, but is also dispersed throughout, very extensive calcification of dolomite, in some areas there are microspar inclusions in the dolomite whereas the spar around the dolomite is much more c xyn, 5% sample porosity between xtals/gns, minor porosity along stylolites, interxyn porosity is highest near stylolites, 'breccia clasts' are difficult to distinguish from 'matrix', because both are composed of microspar, however, clasts are generally lighter in colour because of less brown residue. This concentration of residue may be caused by concentration due to ls dissolution. CL; 2% dull blue-luminescent fluorite after scattered dolomite. Bright orange-luminescent clear calcite (overgrowths along fractures and in part along stylolites). Thick residue along stylolites luminesces a very dull green. Rock Name: f-m calcirudite-sized microsparite 'clast/matrix' crackle (stylo-) breccia.

BASE OF UNIT 20.72 TOP OF UNIT 22.42 THICKNESS 1.70

UNIT D20. Weathering Character rec covered interval. Started on west side of stream, 62 m from waterfall (441 m north of the junction of the inlet and the stream). A 7' dip to the north was measured on the west side of the stream, 62 m north of the waterfall. This thickness therefore should be regarded as minimum since if this 7' dip is constant over the 62 m, the true thickness is 21.6 m. It is not clear in outcrop whether this dip is constant.

BASE OF UNIT 22.42 TOP OF UNIT 36.42 THICKNESS 14.00

UNIT D21. Weathering Character semi-rec. Colour WS and FS interlam vlt buff and m grey. Basal Contact covered. Bedding Character planar lam. Bed/Lam Thickness min 0.5 mm, max 11 cm, mode 7 cm, dk grey carb films 0.5 to 1.0 mm thick, laterally continuous over 5 m wide outcrop, planar, dk lams comprise 5-10%, lt lams 90-95%, dk lams non-uniformly distributed throughout. Composition calc dolostone (perhaps argil), gn/xtal size 0.1 mm. Misc kink bands. D21 Sample/Slab/Thin Section Description (includes bitumen lining joint surfaces, displays flaggy parting), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; planar lams marked by laterally continuous thin dk grey films, black shiny brittle bitumen coats joint or fracture surfaces, also contorted lam (kink banding), composition; 50% microspar, 10% f to c xyn spar, but mainly f xyn, 30% f xyn dolomite, overall it is a dolomitic ls but the dolomite content in the lams varies from pure dolostone to dolomitic ls, excellent examples of extensive calcification of dolomite in which all but clear dolomite rims are replaced by clear spar, also shows selective calcification of lams wherein the least calcified lams contain the most residue. 10% sample porosity. CL; 1% blue luminescent fluorite after dolomite in xtal clusters, otherwise the sample luminesces a uniform very dull red. Rock Name: sparry dolomitic microsparite.

BASE OF UNIT 36.42 TOP OF UNIT 37.82 THICKNESS 1.40

UNIT D22. Weathering Character semi-rec to semi-prom. Colour WS and FS m brownish grey. Basal Contact abrupt, planar. Bedding Character one bed. Composition microxyn calc dolostone, bitumen on fracture and joint surfaces and between breccia clasts.

BASE OF UNIT 37.82 TOP OF UNIT 38.01 THICKNESS 0.19

UNIT D23. Weathering Character semi-rec. Colour WS and FS white to m grey. Basal

Contact abrupt, planar. Bedding Character planar lam/bedding, locally crackle breccia. Bed/Lam Thickness min 0.5 mm, max 11 cm, mode 7 cm, lams carb, dk grey, 0.5 to 1 mm thick, planar, laterally continuous over 5 m wide exposure, 5-10% dk carb lams, 90-95% lt lams non-uniformly distributed in vertical sequence. Composition dolomitic ls containing 1 cm-sized vugs, bitumenous mat'l lines joint surfaces and occurs between clasts in the crackle breccia, black bitumen films on joint surfaces to 3 X 3 cm, Misc similar to unit D21, noticeably deformed below breccia.

BASE OF UNIT 38.01 TOP OF UNIT 38.11 THICKNESS 0.10

UNIT D24. Weathering Character prom. Colour WS buff, varicoloured in detail, generally m brownish, dk grey. FS sl more greyish. Basal Contact deformed irregular, wavy to convex-up, some minor 1 cm-sized vugs. Bedding Character inversely-graded breccia. Composition breccia, clasts min 1 cm, max 1.25 m, poorly sorted, mode 10-15 cm, randomly oriented, no preferred fabric, ang to sbang, large clasts ang to sbrd and are inversely graded wrt size, clasts dolostone, some lam, some contain intraclasts. Black bitumen occurs between breccia clasts, especially in the basal 1.5 m of the unit. Sedimentary Structures high-amplitude stylolites, especially at base of unit, vugs occur throughout breccia. D24 Sample/Slab/Thin Section Description (taken 1 m abu, dk grey clasts), fresh surface colour; breccia clasts (wk vdk olive-brown, 10YR 3/2) in a lt olive-brown (10YR 6/3) 'matrix', sedimentary structures; planar to contorted lams in clasts, high-amplitude stylolites are accentuated by dull black residue, 2% bitumen, 5% dk brown residue in clasts, 10% dolomite, mode 50µm, mainly in 'matrix', com occurs in xtal aggregates, calcitization of dolomite is com, 15% sample porosity, interxyn porosity is as high as 25% in dolostone clasts, 68% breccia clasts (min 2 mm, max 35 mm, mode 6 mm), consist of vf xyn dolomite, most consist of microspar w/ low porosity, 'matrix' between clasts is mainly f-c xyn spar. CL; tr bright orange-luminescent calcite overgrowths on non-luminescent spar-filling vugs, tr blue luminescent fluorite after dolomite, otherwise the sample luminesces a 'cloudy' dull red. Rock Name: m calcirudite-sized solution breccia: microsparite and minor vf xyn dolostone 'clast' spar 'matrix' breccia. Misc this unit varies considerably in thickness laterally (a max thickness is 7 m).

BASE OF UNIT 38.11 TOP OF UNIT 45.11 THICKNESS 7.00

UNIT D25. Weathering character rec covered interval, travelled upstream on east side to find unbrecciated section. Breccia still occurs 486 m from junction of inlet and stream, 69 m asl. On east side of stream higher on the cliffs above the covered interval breccia reappears. However, this breccia forms cylindrical to inverted-cone-shaped pipes (widest at base) adjacent to the stream. The rocks behind these pipes are horizontally stratified, 535 m from the Port Bowen/stream junction. 76 m asl, the breccia pipe crosses the stream in outcrop. At 82 m asl and 571 m north of the stream/inlet junction there are still breccia pipes, 589 m north of stream/inlet junction and 85 m asl it is still breccia. 614 m north of stream/inlet junction and 88 m asl it is still breccia. At 92 m asl and 633 m north of stream/inlet junction the breccia grades laterally into horizontal strata that are flexed downward into breccia. The grey and buff unit continues upstream. However, there is a continuously unbrecciated section here. This unit will be described starting 92 m asl, no unit name is given to the breccia pipe. BASE OF UNIT 45.11 TOP OF UNIT 64.42 THICKNESS 19.31

UNIT D26. Grey and buff interbedded unit starts here, each unit is described separately. Weathering Character prom. Colour WS and FS buff. Basal Contact indet. Bedding Character planar, locally brecciated. Bed Thickness min 25 cm, max 30 cm, faint planar lams. Composition dolostone, calc where locally brecciated, gn size 0.1 to 0.2 mm. Chert occurs in middle of unit as brecciated nodules in a zone 10 cm thick. There are some fractures filled w/ mat'l from overlying unit. Vugs occur in fracture fill and are lined w/ 2 mm-sized spar. In places the upper contact is brecciated. Sedimentary Structures chert nodules, vugs. D26 Sample/Slab/Thin Section Description (taken from middle of unit 10 m north of massive breccia), fresh surface colour; breccia, chert clasts are vwk lt olive-brown (10YR 6/1) in a lt olive-brown (10YR 6/3) dolostone 'matrix', sedimentary structures; chert clast breccia, 5% microspar, 15% f and m xyn spar, misc; chert breccia clasts are very poorly sorted and 8 cm

in size, rd large clasts, ang small clasts, chert clasts contain relict dolomite rhomb ghosts and most contain relict dolomite, some rhomb ghosts in chert contain ghosts of dissolved dolomite cores showing that silicification occurred after calcification of dolomite. This suggests that the sequence of events is calcification of dolomite followed by silicification which in turn is followed by brecciation. 15% f-m xyn dolomite much of which has been silicified. 20% sample porosity occurs mainly between clasts but also within clasts, 60% breccia clasts are larger than 2 mm, clast size max 80 mm, mode 5 mm. CL; 1% dull blue-luminescent fluorite after dolomite between breccia clasts, 10% bright orange-luminescent calcite overgrowths on spar between breccia clasts. Rock Name: sparry dolomitic chert clast breccia.
BASE OF UNIT 64.42 TOP OF UNIT 66.02 THICKNESS 1.60

UNIT D27. Weathering Character prom. Colour WS and FS m brownish grey. Basal Contact abrupt, planar, locally brecciated. Bedding Character stromatolites comprise 30% of unit but mainly planar bedded, intraclasts between stromatolites. Bed/Lam Thickness min 8 cm, max 0.5 m. Composition calc dolostone, locally brecciated, 30% ang to rd intraclasts, 1 cm max size, elongate parallel to bedding. Sedimentary Structures stromatolites, intraformational conglomerate. D27 Sample/Slab/Thin Section Description (of largest stromatolite in middle of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; convex-up structures, mm thick lam, composition; 10% intraclasts to 2.5 mm in size, 60% peloids range from 25 to 150 μ m in size (mode 50 μ m), composed of microspar, 17% microspar, 5% f-m xyn spar, 3% dispersed vf xyn dolomite, 5% porosity along fractures, stylolites and between xtals/gns. Rock Name: sl dolomitic/sl sparry intraclastic and stromatolitic pelmicrosparite.
BASE OF UNIT 66.02 TOP OF UNIT 67.52 THICKNESS 1.50

UNIT D28. Weathering Character prom. Colour WS buff, sl greenish in upper part. FS buff w/ brown patches. Basal Contact abrupt, wavy (wavelength 2 m, amplitude 10 cm). Bedding Character breccia except lower 30 cm which is planar bedded w/ faint lams. Composition breccia, 70% clasts, 30% matrix, dolostone, very sl calc brown carb film comprises 2% of rock, clast size uniform throughout unit, min 2 mm, max 4 cm, mode 2 cm, poorly sorted, sbrd to sbang randomly oriented clasts, tr dk grey 3 cm-sized chert nodules. 1.5 m abu there are clasts to 30 cm in size, elongate parallel to bedding, sbang to rd. D28 Sample/Slab/Thin Section Description (taken 0.6 m abu), fresh surface colour; breccia but overall vwv xlt yellowish-orange (10YR 8/1), misc; breccia clasts com fractured, 60% breccia clasts greater than 2 mm in size, range to 30 mm, 7 mm mode, clasts composed of vf and f xyn dolomite. 'matrix' consists of 25% microspar/f xyn spar, 15% sample porosity (10% between xtals in dolostone clasts and 5% between clasts), most of the porosity is probably due to dissolution of calcified dolomite. CL; 2% blue-luminescent fluorite after dolomite is concentrated in the 'matrix' between clasts. 20% spar between clasts has bright orange-luminescent overgrowths. Otherwise, the dolomite of the sample has a very dull pink luminescence. Rock Name: m calcirudite-sized breccia: vf and f xyn dolostone 'clast' microsparite/f xyn sparite 'matrix' rubble breccia.

BASE OF UNIT 67.52 TOP OF UNIT 70.02 THICKNESS 2.50

UNIT D29. About 96 m asl and 673 m north of steam/inlet junction. Weathering Character semi-prom. Colour WS and FS lt greenish grey. Basal Contact wavy, wavelength 1 m, amplitude 8 cm. Bedding Character one bed, locally brecciated. Composition microxyn dolostone, upper half of unit is breccia, clasts weather white, 10 cm long by 2 cm wide, 673 m north of steam/inlet junction the unit becomes completely brecciated along w/ overlying units, white clasts are calc dolostone, good porosity and permeability, clasts subequant, ang to sbrd, randomly oriented, matrix 50%, clasts 50%. D29 Sample/Slab/Thin Section Description fresh surface colour; breccia-large patches of wk vlt yellowish orange (10YR 7/2) and m olive-brown (10YR 5/3), sedimentary structures; contorted structures grade to crackle breccia w/ minor rubble breccia, 'clasts' and 'matrix' are difficult to distinguish. Note that there is extensively calcified dolomite as microspar replacing dolomite along boundaries. Much of the calcified dolomite has been leached and this has also contributed to the brecciation. Low-amplitude stylolites, overall 20% porosity, most is between xtals in the dolostone clasts,

breccia clasts are composed of porous and permeable vf and f xyn dolomite and variably dolomitic sparry microsparite, 'clasts' are up to at least 60 mm in size, modal size 8 mm, 'matrix' consists of variously dolomitic sparry microspar, 1% vf xyn pyrite. Rock Name: m calcirudite-sized breccia: vf and f xyn dolostone and dolomitic/sparry microsparite 'clast' variably dolomitic microsparite 'matrix' crackle breccia.

BASE OF UNIT 70.02 TOP OF UNIT 70.52 THICKNESS 0.50

UNIT D30. Weathering Character prom. Colour WS m grey overall. FS m brownish grey. Basal Contact abrupt, wavy, wavelength 1 m, amplitude 10 cm, locally brecciated and irregular. Bedding Character planar, sl irregular, tr carb lams, locally brecciated. Bed/Lam Thickness min 2 cm, max 35 cm, mode 8 cm. Composition microxyn calc dolostone (locally brecciated), 40% intraclasts (1 cm in size and rd), tr carb lams. Sedimentary Structures black chert, irregularly-shaped, occurs in brecciated zone. Fossils ostracods (intraclastic unit w/ ostracods, taken from middle of unit, is brecciated in places and has a bituminous odour). D30 Sample/Slab Description fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; planar lam marked by planar low-amplitude stylolites w/ black residue, composition; 20% articulated ostracods to 5 mm in size, mainly filled w/ microspar but some w/ spar, 63% microspar, 5% spar fills vugs and fractures and some articulated ostracods, tr pyrite, 2% black residue along stylolites, some lams may consist of detrital m-c calcilutite, 5% dispersed f xyn dolomite, 5% porosity along stylolites and fractures and between xtals/gns, interxyn porosity is especially high near fractures and stylolites. Rock name: sl dolomitic/sl sparry ostracodal biomicrosparite.

BASE OF UNIT 70.52 TOP OF UNIT 73.92 THICKNESS 3.40

UNIT D31. (700 m north of stream/inlet junction). Weathering Character prom but poor exposure. Colour WS lt to m grey, sl greenish. FS m brownish grey. Basal Contact abrupt, planar. Bedding Character sl wavy, locally rubble breccia (20 cm clast mode). Bed/Lam Thickness min 1 cm, max 11 cm, mode 6 cm, faint lams. Composition microxyn dolostone, some discontinuous carb film on bedding planes, locally brecciated, faintly lam, taken near base of unit. Sedimentary Structures high-amplitude stylolites. D31 Sample/Slab/Thin Section Description fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low and high (to 2 mm) amplitude stylolites, very vague planar lam, composition; 1% ostracods to 0.7 mm in size, filled w/ f-m xyn spar, 66% microspar, 1% f-m xyn spar, 30% f xyn dolomite, contains numerous microspar inclusions and is com corroded, dolomite is concentrated along stylolites. It is not clear whether micropar inclusions in dolomite are due to calcification of dolomite or incomplete dolomitization, 2% porosity along stylolites. CL; non-luminescent. Rock Name: dolomitic (f xyn) microsparite.

BASE OF UNIT 73.92 TOP OF UNIT 74.32 THICKNESS 0.40

UNIT D32. Back to 673 m north of stream/inlet junction, measuring up cliff, inaccessible unit.

Weathering Character semi-prom. Colour WS and FS m brownish grey. Basal Contact trans over 5 cm, planar. Bedding Character planar, sl irregular. Bed Thickness min 2 cm, max 35 cm, mode 8 cm. Composition microxyn calc dolostone, otherwise similar to unit D30.

BASE OF UNIT 74.32 TOP OF UNIT 77.82 THICKNESS 3.50

UNIT D33. Weathering Character prom. Colour WS and FS m brown, upper 30 cm of unit weathers buff. Basal Contact abrupt, planar. Bedding Character planar irregular, locally digitate stromatolites. Bed/Lam Thickness min 1 cm, max 30 cm, mode 8 cm Composition microxyn calc dolostone, approx 40% 5 mm to 2 cm-sized sbrd intraclasts on bedding plane surfaces. Sedimentary Structures poorly developed stylolites, hummocky structures in upper metre of unit have a 1 m wavelength but this is less elsewhere. Fossils 5 mm long echinoderm stem. Misc unit is extensively fractured, irregular joint surfaces. Bed parting thickness is 1 cm in upper 30 cm of unit. D33 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, 60% intraclasts to 5 mm in size, mode 0.6 mm, larger intraclasts are rd, composed of pelmicrosparite, 1%

articulated ostracods to 0.8 mm in size, filled w/ m-c xyn spar, 17% microspar, 5% spar, 2% dk brown insoluble mat'l along stylolites, 10% f xyn dolomite, com calcified, 5% porosity along stylolites and fractures. Rock Name: sl sparry/dolomitic intramicrosparite. D33a Sample/Slab Description (of small stromatolitic structure 0.6 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; digitate stromatolites, 79% microspar, 1% bitumen, tr pyrite, 15% f xyn dolomite, 5% interxyn porosity. CL; 1% blue-luminescent fluorite after dolomite, 15% very dull orange-luminescent uniformly distributed dolomite. Microspar is non-luminescent. Rock Name: dolomitic microsparite.
BASE OF UNIT 77.82 TOP OF UNIT 79.42 THICKNESS 1.60

UNIT D34. Weathering Character semi-prom. Colour WS buff. FS m brownish grey. Basal Contact abrupt, planar. Bedding Character massive. Composition microxyn sl calc dolostone. Sedimentary Structures sl slickensided. D34 Sample/Slab/Thin Section Description (taken at base of unit, sl slickensided), fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; moderately bioturbated, composition; 62% microspar, 30% f to m xyn sparry patches in microspar, spar lines fractures, 3% vf to f xyn dolomite (com calcified), 5% porosity along fractures, stylolites, and between xtals/gns. CL; 30% dull orange-luminescent calcite is distributed uniformly through the non-luminescent sample. In addition, there are bright orange-luminescent overgrowths in sparry patches along subvertical fractures (5%). Rock Name: sl dolomitic/sparry microsparite.
BASE OF UNIT 79.42 TOP OF UNIT 79.61 THICKNESS 0.19

UNIT D35. Weathering Character semi-prom. Colour WS buff. FS m brownish grey. Basal Contact abrupt, planar. Bedding Character variable, upper 0.5 m planar, middle unit (0.3 m) massive, basal 0.4 m planar bedded. Bed/Lam Thickness basal and upper parts 1 mm to 1 cm planar lams, flaggy parting, middle of unit massive. Composition microxyn dolostone, lower and upper parts possibly argil. Misc very poor exposure, upper and lower zones have 1 mm thick planar lams. D35 Sample/Slab Description (lower and upper units are possibly argil w/ flaggy parting, sample taken from massive bed), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 79% microspar, 1% f xyn spar, 15% evenly dispersed vf-f xyn dolomite is concentrated along stylolites and is com calcified, 5% porosity along stylolites and between xtals/gns. CL; 5% bright orange-luminescent composite spar after uniformly scattered gypsum xtals, 1% uniformly distributed moderately blue-luminescent fluorite after dolomite. Rock Name: dolomitic microsparite.
BASE OF UNIT 79.61 TOP OF UNIT 80.71 THICKNESS 1.10

UNIT D36. Weathering Character prom. Colour WS and FS mottled, m brownish grey and buff. Basal Contact abrupt, planar. Bedding Character mottled. Composition very sl calc dolostone. Sedimentary Structures mottle concentration increases upward in unit, 5% mottles at base, 50% near top, mottles are elongate subparallel to unit contacts. D36 Sample/Slab/Thin Section Description (taken 90 cm abu), fresh surface colour; mottled, overall lt olive-brown (10YR 6/3), sedimentary structures; subvertical slickensides, tr laterally discontinuous wispy stylolites, irregularly-shaped isolated patches of microspar w/ sharp boundaries 'floating' in variously dolomitic 'matrix', one 0.7 mm long ostracod, 55% microspar (of which 5% is pseudomorphic after gypsum? xtals), tr f to m xyn spar, tr pyrite, 40% f xyn dolomite xtals that in sparry areas have clear rims and inclusion-rich cores, dolomite rhombs are com corroded and contain microspar inclusions-probably calcification of dolomite, 5% interxyn porosity. CL; dolomite luminesces a dull orange-red. Most of the calcite is non-luminescent except for bright orange-luminescent calcite overgrowths on spar after gypsum xtals. Rock Name: mottled dolomitic (f xyn) microsparite.
BASE OF UNIT 80.71 TOP OF UNIT 81.91 THICKNESS 1.20

UNIT D37. Weathering Character prom. Colour WS and FS m brownish grey and buff, mottled. Basal Contact abrupt, planar. Bedding Character planar. Bed/Lam Thickness min 3 cm, max 30 cm, mode 10 cm, 1 mm thick faint lams. Composition sl calc dolostone,

intraclastic zone 1.24 to 1.5 m abu. Sedimentary Structures stromatolites occur in upper 0.5 m of unit 37, wavelength 0.25 m, mottled. D37 Sample/Slab Description (from intraclastic zone), fresh surface colour; mottled wk dk olive-brown (10YR 4/2) and vlt yellowish orange (10YR 7/3), sedimentary structures; intraclasts, low-amplitude stylolites, dolomitic mottles, composition; 30% rd elongate intraclasts 2 cm in size, composed of microspar, 30% microspar between intraclasts, tr spar, 30% f xyn dolomite is concentrated in irregularly-shaped mottles, 10% interxyn porosity. Rock Name: mottled dolomitic (f xyn) intramicrosparite.
BASE OF UNIT 81.91 TOP OF UNIT 84.51 THICKNESS 2.60

UNIT D38. Weathering Character prom ledge-former. Colour WS generally buff w/ yellowish brown patches, 10% orange weathering surfaces. FS m brownish grey to buff. Basal Contact trans over 5 cm. Bedding Character breccia w/ uniform clast size. Composition breccia, clasts mostly dolostone, ranging to 35 cm in size, large clasts sl more rd than small clasts. D38 Sample/Slab/Thin Section Description (is unoriented, taken from top of breccia, clasts subparallel to bedding, many subequant), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; irregularly-shaped chert nodule at least 4 cm in size, contains gypsum xtal moulds, composition; 10% microspar, 50% spar, 10% chert nodules, 20% f-m xyn dispersed, dolomite rhombs, excellent examples of calcified dolomite, 10% sample porosity (5% gypsum xtal moulds w/ swallowtails to 1.5 mm long by 0.1 mm wide, 5% interxyn porosity). CL; non-luminescent except for 20% bright orange-luminescent composite spar after gypsum xtals. The luminescent overgrowths occur on non-luminescent cores, Rock Name: cherty dolomitic (f-m xyn) microsparite breccia.

BASE OF UNIT 84.51 TOP OF UNIT 86.01 THICKNESS 1.50

END OF SECTION D IN LOWER MEMBER OF CAPE CRAUFORD FORMATION,
 CONTINUED AS SECTION DX.

E. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION DX, PORT BOWEN, MEASURED IN 1984.

Locality: North Shore of Port Bowen, Section DX continues unfinished section D measured in 1982.

Latitude: 73°13'54"N.

Longitude: 88°56'W.

UNIT DX1. Undescribed interval, sealevel is taken as 0 in this section.

BASE OF UNIT 0.00 TOP OF UNIT 94.50 THICKNESS 94.50

UNIT DX2. Weathering Character prom. Colour WS & FS m brown/buff clasts, 20% dk grey clasts. Basal Contact covered. Bedding Character locally brecciated in 20-30 m wide, 30 m high breccia pipes. Composition clast-supported breccia, buff dolostone and dk brown ls. clasts in a f matrix, tr dk grey chert. Some of the clasts are themselves composed of f clast breccia of buff dolostone w/ a tr of chert, one of the breccia clasts is 80 cm long and consists of small clasts (min 1 cm, max 3 cm, mode 2 cm). Sedimentary Structures contorted bedding in dolostone clasts, digitate 'stromatolites' in buff clast about 2 m below base of unit. DX2 Sample/Slab/Thin Section Description (taken 2 m abu showing buff clasts), fresh surface colour; breccia, wk xlt yellowish-orange (10YR 8/2) 'clasts' in a wk vlt yellowish-orange (10YR 7/2) 'matrix'. sedimentary structures; breccia, vugs, composition; 1% interxyn bitumen, large ang dolostone clasts to 10.5 cm in size, some clasts appear folded, dolostone clasts are fractured and extremely porous, some are entirely dissolved, 20% porosity (5% dolostone clast moulds, 15% interxyn porosity in dolostone clasts), large ang dolostone clast to 10.5 cm, 5% polyxyn quartz and chert clasts, part of dolostone clast is fractured, 50% clasts (min 2 mm, max 10.5 cm, mode NA), 'matrix' consists of dolomitic f xyn spar. The outer 1 cm of the clast consists of dolomitic f xyn spar, much of which is calcified dolomite in the

form of spar replacing dolomite rhomb edges and cores. The center of the clast has been leached of spar and consists of porous f-m xyn dolomite. However, about 3% spar remains, including spar-replaced dolomite cores (excellent examples w/ large xtals). CL; dull red-luminescent except for 1% dull blue-luminescent fluorite after dolomite. Rock Name: vuggy f-m xyn dolostone 'clast'-dolomitic f xyn spar 'matrix' rubble breccia.
BASE OF UNIT 94.50 TOP OF UNIT 99.50 THICKNESS 5.00

UNIT DX3. Weathering Character prom. Composition mottled dk brown ls, very poorly bedded. Fossils gastropods, orthocones, crinoid stems. DX3a Description (taken 1.5 m abu), low-spired conispiral gastropods to 20 mm high (25 mm diameter)
BASE OF UNIT 99.50 TOP OF UNIT 103.10 THICKNESS 3.60

UNIT DX4. Weathering Character prom. Colour WS & FS buff. Composition locally brecciated calc dolostone, lam w/ carb films. Sedimentary Structures lam, wavy bedding, large convex-up structures w/ carb lams from 8.9 to 12.9 m abu, wavelength is 50 cm, amplitude is 30 cm. DX4 Sample/Slab/Thin Section Description (taken 14.4 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; convex-up structures (15 mm wide, 10 mm amplitude), lams 1 mm thick, misc; minor fracture porosity, composition; 70% f xyn (30 μ m mode) dolomite, 30% porosity along fractures and between xtals, vugs to 200 μ m in size. CL; tr moderately blue-luminescent fluorite after dolomite, 1% bright orange-luminescent overgrowths on dolomite in vugs. Rock Name: vuggy f xyn dolostone.
BASE OF UNIT 103.10 TOP OF UNIT 119.50 THICKNESS 16.40

UNIT DX5. Weathering Character prom. Colour m brown to buff. Composition dolostone, <1% black chert, vuggy buff dolostone, local breccia between 5.5 & 6.5 m abu. Sedimentary Structures unbedded to vaguely bedded, some convex-up structures (7 cm wavelength, 1 cm amplitude 4.5 m abu). DX5 Sample/Slab/Thin Section Description (small litho sample taken 1.0 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; vugs, composition; 3% f and m xyn spar to 200 μ m in size, 67% f-m xyn dolomite xtals, 30% porosity (10% vugs to 3 mm in size and 20% between xtals), dolomite rhombs are extensively leached. Rock Name: vuggy sl sparry/f xyn dolostone. DX5a Sample/Slab Description (small litho sample 5.0 m abu), fresh surface colour; interlam wk vlt yellowish orange (10YR 7/2) and wk lt olive-brown (10YR 6/2), sedimentary structures; irregular mottles 4 mm in size, lams 1 mm thick, composition; 2% spar between dolomite, 88% f xyn dolomite, 10% interxyn porosity. CL; 5% bright orange-luminescent overgrowths on limpid dolomite in vugs. Rock Name: sl sparry f xyn dolostone.
BASE OF UNIT 119.50 TOP OF UNIT 126.00 THICKNESS 6.50

UNIT DX6. Weathering Character prom. Composition mottled ls at 0.0 and 3.1 m abu, lam ls 4.0 m abu. Sedimentary Structures high-amplitude stylolites 4.0 m abu in lam ls w/ convex-up structures that increase in size upward in the unit. Between 3.0 & 3.3 m abu-small scale wavy structures (20 cm/wavelength, 5 cm amplitude), structures increase in size upwards. Branching digitate stromatolites 3.0 m abu, individual digits are 3 cm wide and branch every 10 cm, lams in digits are convex-up. Fossils turretelid gastropod 2.0 m abu. Misc colour changes are poorly documented and difficult to recognize but units are generally interlayered buff & dk brown. DX6 Sample/Slab/Thin Section Description fresh surface colour; overall lt olive-brown (10YR 6/3), sedimentary structures; dolomitic mottles, low-amplitude stylolites, composition; 65% microspar, 10% micrite, tr bitumen, 20% f-m xyn dolomite, 5% interxyn porosity. CL; 1% bright orange-luminescent calcite overgrowths on composite spar after gypsum. Rock Name: mottled dolomitic/micritic microsparite. DX6a Sample/Slab Description (of intraclasts 1 m abu), fresh surface colour; lt olive-brown (10YR 6/3), composition; 65% clotted microspar, 10% spar, 15% m xyn dolomite (100 μ m mode), 10% porosity (5% vugs to 0.5 mm and 5% between xtals). Rock Name: dolomitic/sparry microsparite. DX6b Sample (of mottled ls 3.1 m abu) DX6c Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2) and wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, digitate stromatolites, microspar and f xyn spar in a clotted texture

in stromatolites, composition; 25% intraclasts (to 25 mm in size), 1 mm mode, composed of microspar, tr brachs, 1 cm-sized turretelid gastropod frag, shell is composed of m xyn dolomite rhombs, gastropod is filled w/ microspar, 45% microspar in total, 5% spar, 20% f-m xyn dolomite mainly in areas between digits, calcified dolomite com, mainly as microspar replacing dolomite rhomb edges, good examples of calcified dolomite are rare. 5% interxyn porosity. Rock Name: microsparitic digitate stromatolites w/ intraclastic f-m xyn dolomite between digits. DX6d Sample/Slab/Thin Section Description (taken about 4 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; convex-up structures to 40 mm wide by 20 mm high, high-amplitude stylolites, composition; 30% f xyn spar, 35% peloids composed of microspar, 20% f-m xyn dolomite is concentrated along stylolites, 5% interxyn porosity. Rock Name: dolomitic (f-m xyn) pelmicrosparite. DX6e Sample/Slab/Thin Section Description (rep litho sample taken 3.2 m abu), fresh surface colour; vlt yellowish orange (10YR 7/3), sedimentary structures; extremely ang lateral wedge-out of lams, immediately overlain by breccia, therefore the wedge-out of lam may be related to carbonate solution brecciation, minor coated gns. composition; 60% microspar, 25% f-m xyn dolomite in mm-sized patches, calcified dolomite is com, 5% interxyn porosity, 10% gypsum xtal moulds to 7 mm long. CL; dull red-luminescent dolomite, calcite is non-luminescent. Rock Name: dolomitic pelsparite, locally brecciated.

BASE OF UNIT 126.00 TOP OF UNIT 137.00 THICKNESS 11.00

UNIT DX7. Weathering Character prom. Colour WS & FS buff. Composition dolostone, moderate vuggy porosity between lams of structures. Sedimentary Structures convex-up structures. (30 cm wide and 15 cm high).

BASE OF UNIT 137.00 TOP OF UNIT 137.50 THICKNESS 0.50

UNIT DX8. Weathering Character prom. Colour WS & FS buff. Basal Contact convex-up structures to 30 cm wide and 15 cm high. Composition dolostone breccia w/ 10% dolostone and chert clasts (modal clast size about 5 cm).

BASE OF UNIT 137.50 TOP OF UNIT 139.00 THICKNESS 1.50

UNIT DX9. Weathering Character prom thick grey ls at base of upper member of the Cape Crauford Fm. Colour WS & FS m grey w/ buff mottles. Basal Contact irregular, brecciated and locally collapsed. Bedding Character mottled. Composition mottled ls, locally brecciated at base. Sedimentary Structures slickensides. Fossils gastropods. Samples DX9 (conodonts).

BASE OF UNIT 139.00 TOP OF UNIT 153.00 THICKNESS 14.00

UNIT DX10. Weathering Character rec covered interval.

BASE OF UNIT 153.00 TOP OF UNIT 159.00 THICKNESS 6.00

UNIT DX11. Weathering Character prom. Basal Contact covered. Colour WS & FS m brownish grey ls, buff dolostone. Composition c xyn ls interbedded w/ calc dolostone contains coated gns, tr chert, locally brecciated. DX11 Sample/Slab/Thin Section Description (taken 0.5 m abu, of coated clasts), fresh surface colour; wk xlt yellowish orange (10YR 8/2), sedimentary structures; coated elongate clasts to 15 mm long, composition; coatings are superficial, thin and resemble stylolitic residue, gns are composed of f xyn dolomite (w/ com calcified dolomite), m xyn limpid dolomite (100µm mode) lines intergranular pores, the remaining intergranular porosity is filled w/ m xyn spar, spar also fills numerous subvertical fractures, total spar content is 10%, gns are com deformed, 65% vf-f xyn dolomite w/ 3% inclusions, 25% interxyn porosity. CL; 5% bright orange-luminescent overgrowths on clear spar that fills vugs. Dolomite luminesces dull red. FLUOR; com zoned vug-filling dolomite. Rock Name: coated gn/clast (m calcirudite-sized) sparry vf-f xyn dolostone.

BASE OF UNIT 159.00 TOP OF UNIT 164.00 THICKNESS 5.00

The base of DX12 is taken as the contact between the upper and lower members of the Cape Crauford Formation.

UNIT DX12. Weathering Character prom. Colour WS & FS brown. Sedimentary Structures faint planar bedding (approx 5 cm thick), small-scale irregular, massive in places, locally brecciated. Composition ls.

BASE OF UNIT 164.00 TOP OF UNIT 166.50 THICKNESS 2.50

UNIT DX13. Weathering Character rec covered interval.

BASE OF UNIT 166.50 TOP OF UNIT 171.00 THICKNESS 4.50

UNIT DX14. Weathering Character prom. Colour WS & FS mottled buff. Composition mottled dolostone, <1% chert nodules, <1% pyrite, brecciated in basal 0.5 m. Misc DX14 grades into scree which continues approx 30 m higher than top of unit. Samples DX14 (conodont sample).

BASE OF UNIT 171.00 TOP OF UNIT 217.00 THICKNESS 46.00

A misc conodont sample (SP1) was taken about 150 m asl 1.3 km east of section D at lat. 73°13'28"N, 89°17'50"W) from the uppermost few metres of the lower member of the Cape Crauford Formation.

Another misc conodont sample (Th1) was taken from the basal part of the upper member of the Cape Crauford Formation on the south side of Port Bowen. This unit also contains solitary and colonial corals, stromatoporoids and gastropods.

F. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION TL, MEASURED IN 1984

Locality: Northeast end of Port Bowen.

Latitude: 73°13'12"N.

Longitude: 88°48'00"W.

Section TL was measured through the uppermost part of the lower member of the Cape Crauford Formation up the northernmost side of a 10 m wide collapse structure (paleodoline). The base of unit TL1 is taken as equivalent to 107 m in section DX.

UNIT TL1. Weathering Character prom. Basal Contact covered. Bedding Character breccia. Composition breccia, 40% dk grey ls clasts, 40% buff dolostone clasts, 20% f clasts (<1 cm) consist of mat'l less than 1 cm in size in a calc 'matrix', low porosity. Clasts contain ossicles (clast size min 1 cm, max 0.7 m, mode 5 cm), about 1% chert clasts, are randomly oriented ang to sbang, some ls clasts are extremely stylolitic. Sedimentary Structures high-amplitude stylolites.

BASE OF UNIT 0.00 TOP OF UNIT 3.00 THICKNESS 3.00

UNIT TL2. Weathering Character rec covered interval.

BASE OF UNIT 3.00 TOP OF UNIT 9.50 THICKNESS 6.50

UNIT TL3. Weathering Character prom. Basal Contact covered. Bedding Character breccia. Composition interbedded sl brecciated ls & dolostone as for TL1, fractures throughout unit, some parts more brecciated than others. Sedimentary Structures high-amplitude stylolites throughout. Fossils stromatoporoids or stromatolites & ossicles, one clast contains many ossicles w/ star-shaped axial canals. Misc lowest part of collapsed upper unit is 18.8 m abu. BASE OF UNIT 9.50 TOP OF UNIT 28.30 THICKNESS 6.50

UNIT TL4. Weathering Character prom ledge-former. Composition microxyn ls, locally brecciated. Misc thickness varies w/ collapse & faulting. Samples TL4 (conodonts). TL4a Sample/Slab/Thin Section Description (taken 40 cm abu), fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; vaguely lam, composition; 5% micrite, 35% microspar, 1% pyrite, 55% f xyn evenly dispersed dolomite, 5% porosity, extensively calcified dolomite, especially as replaced edges of dolomite rhombs. CL; an overall very dull

orange-red luminescence. Rock Name: microsparitic/sl micritic f xyn dolostone.
BASE OF UNIT 28.30 TOP OF UNIT 31.30 THICKNESS 3.00

UNIT TL5. Weathering Character rec covered interval.
BASE OF UNIT 31.30 TOP OF UNIT 49.70 THICKNESS 18.40

Note that 57 m in unit TL6 is taken as the contact between the upper and lower members of the Cape Crauford Formation.

UNIT TL6. Weathering Character prom, upper 5 m is a very prom ledge-former and an excellent marker bed. Colour WS m brown w/ black lichen covering. FS m brownish grey. Composition microxyn ls w/ wavy lams (0.5 cm thick), locally brecciated. Sample TL6 taken for conodonts. TL6a Sample/Slab/Thin Section Description (rep litho sample taken 0.30 m abu, contains convex-up structures), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, wavy lam (2 cm wavelength, 3 mm amplitude), composition; 30% microspar, 30% f xyn spar, 35% f-m xyn dolomite, extensively calcified dolomite in the form of microspar replacing dolomite rhomb edges as well as (to a lesser extent) dolomite rhomb cores, 5% porosity. CL; a very dull orange-red luminescent dolomite, calcite is non-luminescent, tr bright orange-luminescent subvertical hairline fractures. FLUOR; fluorescent dolomite rhombs. Rock Name: dolomitic (f-m xyn) microsparite.
BASE OF UNIT 49.70 TOP OF UNIT 59.70 THICKNESS 10.00

G. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION E, MEASURED IN 1983.

Locality: Type section of Cape Crauford Fm at Cape Crauford.
Latitude: 73°45'50"N.
Longitude: 84°55'40"W.

The base of the section starts within member B of the Baillarge Formation.
Stream north of base camp at lat. 73°45'41"N, long. 84°54'00"W, The first outcrop is 51.2 m west of Lancaster Sound on north side of stream.

UNIT Ea1. Weathering Character rec. Colour WS and FS mottled m grey and m brownish grey. Basal Contact covered. Bedding Character mottled. Bed/Lam Thickness min 4 cm, max 20 cm, mode 10 cm. Composition dolomitic ls. Ea1 Sample/Slab/Thin Section Description fresh surface colour; mottled wk vdk olive-brown (10YR 3/2) and wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites (dolomite near stylolites) and dolomitic mottles, composition; 10% ostracods (many articulated), 1% stick bryozoans to 5 mm long, 5% ossicles, monaxon sponge spicules (composed of f xyn spar), tr gastropods to 2 mm in size, 5% micrite, 44% microspar and 10% spar in a clotted texture, 1% polyxyn quartz replaces carbonate, tr interxyn bitumen, 20% f xyn dolomite (mode 35µm) is concentrated near stylolites, dolomite rhombs are com calcified i.e., edges of large dolomite rhombs are corroded w/ ghost rhomb shape preserved, dolomite rhombs in some cases contain microspar inclusions. 5% porosity along fractures, stylolites, and between xtals/gns. CL; a uniform very dull red-luminescent dolomite, calcite is non-luminescent. FLUOR; 20% spar filling ostracods is zoned. Rock Name: mottled dolomitic ostracodal biomicrosparite.
BASE OF UNIT 0.00 TOP OF UNIT 2.25 THICKNESS 2.25

UNIT Ea2. Outcrop starts 217 m west of the stream/ Lancaster Sound junction, is 20 m long and 3 m high. Weathering Character prom. Colour WS and FS m dk grey w/ m brownish grey mottles. Basal Contact covered by stream. Bedding Character dominantly large scale planar, small scale irregular wavy (wavelength about 10 cm), bedding cuts across mottles. Bed/Lam Thickness min 5 cm, max 50 cm, mode 20 cm. Composition mottled dolostone, gn/xtal size

mode 0.1 mm. Sedimentary Structures mottles, spheroidal regular to irregular white 'concretions' concentrated in a 0.5 m thick bed, laterally extensive throughout the outcrop-occurs 3 m abu, min size 2 cm, max 7 cm, mode 4 cm. 'Concretions' are porous, powdery, soft, some have brown rinds and are probably altered mottles. Fossils tr favositid corals, corallites lined w/ spar and filled w/ shiny brittle bitumen. Corallites filled w/ 0.5 mm spar. Mostly small in situ colonial corals, max 30 cm across w/ 4 mm diameter corallites (sampled). Ossicles constitute a relatively minor proportion. One poorly preserved 2 cm-long orthoconic nautiloid 4 m abu. Misc well indurated, bitumenous odour, two joint surfaces lined with spar, more dk grey mottles in upper part of unit, dk grey in basal 3 m, upper 3 m contains 80% dk mottles, upper 2 m is inaccessible. Ea2 Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish orange (10YR 7/2), composition; 100% favositid coral, 5% microspar comprises corallite walls, 69% f to c xyn spar fills corallites, 1% shiny black brittle bitumen fills corallites, 5% porosity, 20% white silica replaces and fills corallites some of which is length-slow chalcedony, most however is polyxyn quartz some of which has replaced spar. CL; 5% orange-luminescent zoned spar fills corallites. FLUOR; isopachous spar lining corallites is lt fluorescent, spar filling corallites is non-fluorescent. Rock Name: favositid coral; siliceous f-c xyn sparite.

BASE OF UNIT 2.25 TOP OF UNIT 8.25 THICKNESS 6.00

UNIT E3. Rec covered interval.

The base of unit 4 is correlated within a few metres w/ the base of unit 2.

UNIT Eb4. 498 m west of stream/ Lancaster Sound junction, 4.95 m asl on south side of stream. Weathering Character prom, good exposure, lt brown mottles stand out in relief due to differential weathering. Colour WS mottled, m brownish grey, resistant mottles are lt brownish grey. FS m brownish gy, no difference in colour between mottled and unmottled mat'l on fresh surface. Basal Contact obscured by stream. Bed/Lam Thickness massive. Composition dolomitic mottled ls, xtal size <0.10 mm, dolomitic zone occurs adjacent to joints. Sedimentary Structures 30% lt mottles, 70% m-dk brown calc mat'l, mottles are elongate parallel to bedding and deflect around favositid corals and stromatoporoids. Fossils <1% favositid(?) corals, (3-5 cm in size), concentrated in places, most in place but many small corals overturned, moderately well preserved w/ bitumen filling corallites in the center of colonies, 2-3% stromatoporoids w/ preserved pillars, mushroom, bun-shaped, stacked, both in and out of place, many (mostly the smaller ones) on their sides, larger ones dominantly in place, modal size 5 cm, range 3-20 cm, mottles extend around stromatoporoids. Orthoconic nautiloids <1%-poor to well preserved, many randomly oriented orthocone frags w/ chambers, size 5 to 20 cm long, 1.5 to 4 cm wide, 2-3% ossicles, rare stem frag 1 cm long. Gastropods, <1%, poorly preserved. Mottles are randomly situated but extend around stromatoporoids and favositid corals, some ossicles occur inside mottles. Misc well indurated, bitumenous odour, well-developed joints. Eb4 Sample/Slab/Thin Section Description (taken from middle of unit, contains mottles), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; 30% dolomitic mottles are bounded by low-amplitude stylolites, composition; 10% well preserved spheroidal stromatoporoids, 3% ossicles, 1% gastropods, 20% ostracod frags, 6% articulated ostracods, one graptolite in slab, 5% poorly defined peloids composed of microspar, 15% microspar, 10% f xyn spar, 3% silica replaces fossil frags, 3% interxyn brown opaque mat'l between dolomite xtals, 25% f-m xyn dolomite (range 25-75µm), stylolites form boundaries between dolomitic mottles and ls, 1% porosity along stylolites and fractures and 4% porosity between xtals. Rock Name: mottled dolomitic/sparry/ostracodal biomicrosparite Eb4a Sample/Slab Description (stromatoporoids from top of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, composition; 54% fossils, consisting of 40% compound stacked bun-shaped stromatoporoids to 45 mm wide, one (10%) favositid coral 35 mm in size, one 1.5 mm diameter cup coral, 1 brach frag, 5% white silica replaces corals, stromatoporoids and some ostracod valves, 1% ossicles, 3% ostracods, 14% microspar, 10% spar fills corallites, 2% interxyn bitumen (especially in the dolomitic mottles), 15% f-m xyn dolomite is

concentrated in mottles, 5% interxyn porosity. CL; 1% blue luminescent fluorite after dolomite, dolomite luminesces dull red, calcite is non-luminescent. Rock Name: mottled dolomitic/sparry biomicrosparite.

BASE OF UNIT 4.95 TOP OF UNIT 5.35 THICKNESS 0.40

UNIT Eb5. Weathering Character prom, good exposure. Colour WS and FS varies dk gy w/ irregular rusty brown patches, dominantly dk grey, fossils weather white. Basal Contact abrupt irregular, large scale planar. Bedding Character planar. Bed/Lam Thickness 0.6 m. Composition dolostone w/ calc corals and stromatoporoids filled w/ bitumen, orthocones filled w/ 1 mm-sized spar between sutures, xtal size <0.1 mm, many shells recrystallized and comprised of large xtals. Central corallites of favositid corals filled with bitumen, outer corallites lined w/ spar. Fossils 2-3% stromatoporoids, range 2 to 30 cm, mode 5 cm, randomly oriented, some have a convex-up shape (6 cm wide, 10 cm high), one is 24 cm wide and filled w/ bitumen and is inclined 30° from the horizontal), 5% single ossicles, entire stems are rare but range to 2 cm long, <1% favositid corals range from 4 to 30 cm in size, bitumen com fills corals, 1 *Catenipora* (15 by 8 cm), solitary corals very rare, in place, 1.5 cm diameter w/ a columella, specimen sampled 40 cm abu, <1% brachs range to 5 cm w/ a 0.5 mm thick calc valve, tr m spired gastropods to 4.5 cm high, w/ max diameter of 5.5 cm. One orthoconic nautiloid (1%) to 20 cm long with sutures, aperture to 5 cm wide. Misc bitumenous, fractured w/ spar veins filling some fractures. Eb5 Sample/Slab/Thin Section Description (favositid coral) fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, composition; 35% fossils, 10% favositid corals (one is 60 mm wide), 15% ossicles, 5% articulated and disarticulated ostracods, 5% stromatoporoids (one is 30 mm wide and well preserved), 5% peloids composed of microspar, 20% microspar, 5% spar, 5% quartz partly replaces carbonate, 3% white fibrous chalcedony, 10% bitumen along stylolites, fractures and between xtals/gns. Bitumen occurs in dolomitic mottled areas, some frags silicified, 15% m xyn dolomite is close to stylolites, calcification of dolomite is com (corroded edges and rare replaced cores), 2% porosity along stylolites. CL; dolomite in general luminesces very dull red, calcite is non-luminescent and there is a tr of blue-luminescent fluorite after dolomite. FLUOR; ossicles fluoresce a moderate white. Rock Name: mottled bitumenous/dolomitic biomicrosparite. Eb5a Sample/Slab Description (favositid coral), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles, composition; 13% fossils, 5% favositid corals (one is a 30 mm wide frag), 5% ossicles, 3% ostracod frags, 37% microspar, 25% spar, 10% bitumen occurs preferentially in dolomitic mottles, 3% white silica spherules, 10% f-m xyn dolomite (50µm mode, ranges to 100µm), is mainly concentrated in mottles, 2% sample porosity between xtals/gns. CL; a very dull green luminescent dolomite, tr blue-luminescent dolomite, calcite is non-luminescent. FLUOR; bright fluorescent zoned spar lines and fills corallites. Rock Name: mottled bitumenous/dolomitic/sparry biomicrosparite. Eb5b Sample/Slab Description (includes a solitary coral), fresh surface colour; vwv vdk olive-brown (10YR 3/1), composition; 21% fossils, consisting of 1% solitary corals (12 mm diameter), 5% ossicles, one (5%) bun-shaped stromatoporoid 15 mm wide, 10% mainly articulated ostracods. 54% microspar, 5% spar, 4% bitumen, 1% chert partly replaces stromatoporoid and ostracod, 10% f-m xyn dolomite (50µm mode), 5% porosity between xtals/gns. Rock Name: dolomitic/sl sparry biomicrosparite. Eb5c Sample/Slab Description (brach sample taken 40 cm abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), composition; 8% fossils, 1 brach approx 35 mm wide w/ crurae(?), 2% ossicles, 5% stromatoporoids approx 30 mm in size, one is spheroidal, 1% articulated ostracods to 3 mm in size (mode 1 mm). 55% microspar, 5% spar fills fractures, 1 articulated ostracod is filled w/ c xyn spar, 7% bitumen occurs mainly in the dolomitic mottles, 2% white chert spherules, 20% f-m xyn dolomite is concentrated mainly in mottles, 3% sample porosity between xtals. Rock Name: mottled sl bitumenous/fossil-bearing/ dolomitic microsparite.

BASE OF UNIT 5.35 TOP OF UNIT 5.95 THICKNESS 0.60

UNIT Eb6. 535 m from Lancaster Sound/ stream confluence between 1st and 2nd stream bends. Weathering Character prom, no differential weathering between mottles. Colour WS

and FS varies dk grey w/ irregular rusty brown patches, dominantly dk grey, fossils weather white. Basal Contact abrupt, planar. Bedding Character massive. Composition calc dolostone. Fossils poorly preserved stromatoporoids (1%), favositid corals and about 12 or 15 in situ solitary corals along perimeter of stromatoporoid, perhaps in life originally protected by stromatoporoid, one *Catenipora* specimen, tr (<1%) orthocones, ossicles as for unit 5. One 1 cm-sized brach is similar to *Atrypoides*?. Misc more fractured w/ calc veins. Eb6 Sample/Slab Description (rep litho sample taken from middle of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, dolomitic mottles are bounded by stylolites, composition; 25% fossils, consisting of 15% tabular stromatoporoids, 2% favositid corals to 2 cm wide, 5% ossicles and 1% ostracods. 40% microspar, 5% spar, 5% interxyn bitumen mainly in dolomitic mottles, 3% white chert partly replaces stromatoporoids, 20% f-m xyn dolomite is concentrated mainly in dolomitic mottles, 5% interxyn porosity. Rock Name: dolomitic/sl cherty/sl bitumenous biomicrosparite. Sample Eb6a-brach sample.

BASE OF UNIT 5.95 TOP OF UNIT 6.55 THICKNESS 0.60

UNIT Eb7. 535 m from Lancaster Sound. Weathering Character semi-prom, moderately good exposure. Colour WS and FS m to dk gy w/ minor wispy lt brown areas. Basal Contact abrupt planar, irregular on a small scale. Bedding Character planar lam. Bed Thickness min 15 cm, max 35 cm, mode NA. Composition calc dolostone, xtal size <0.1 mm, calcite concentrated in small veinlets, white dolomite xtals on some fracture surfaces. Sedimentary Structures some wispy mottles. Fossils 5% ossicles, only 1 brach, rare stromatoporoids, one is overturned and moderately well preserved, rare colonial corals, one by stromatoporoid has bitumen filling the central corallites, one orthoconic nautiloid. Misc outcrop partly covered, unit is fractured and rocks are loose in outcrop, few bedding surfaces preserved, bitumenous odour. Eb7 Sample/Slab/Thin Section Description (rep litho sample from middle of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites and dolomitic mottles, composition; 25% partly dolomitic fossils, 5% ossicles, 1 stick bryozoan frag, 1 brach valve 7 mm wide, 20% ostracod frags, 35% peloids ranging from 50 to 250 μ m in size (100 μ m mode) composed of microspar. 5% micrite, 5% microspar, 5% spar fills subvertical microfractures and the centers of articulated ostracods, 5% bitumen, dolomite replaces or partly replaces fossil frags, total 15% f-m xyn dolomite (50 μ m size mode), extensively calcified dolomite, dolomite rhombs are com replaced by composite spar. 5% porosity. FLUOR; vugs are filled w/ fluorescent-zoned spar. Rock Name: sl bitumenous dolomitic biopelmicrosparite. Eb7a Sample/Slab Description (orthoconic nautiloid from top of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles, low-amplitude stylolites, some at right angles to bedding, composition; 30% fossils, consisting of one orthocone frag (20 mm diameter by 40 mm long), one 7 mm diameter solitary coral, one 30 mm wide favositid coral frag, 10% undifferentiated bioclastic debris, 40% microspar, 10% spar fills corallites, 2% white silica partly replaces walls of solitary and colonial corals, 15% f-m xyn dolomite (50 μ m mode), dolomitic mottled areas are bounded by low-amplitude stylolites. 5% interxyn porosity. CL; tr moderately blue-luminescent fluorite after dolomite, generally in fossil frags, especially ossicles. In general, dolomite is dull red-luminescent and calcite is non-luminescent. Rock Name: mottled dolomitic/sparry biomicrosparite.

BASE OF UNIT 6.55 TOP OF UNIT 8.05 THICKNESS 1.50

UNIT Eb8. Weathering Character semi-prom, poorly exposed, partly covered, steep and inaccessible. Colour WS and FS-m to dk gy w/ minor lt brown wispy areas. Basal Contact abrupt planar. Bedding Character planar. Bed Thickness min 20 cm, max 50 cm, mode 30 cm. Composition calc dolostone, xtal size <0.1 mm. Sedimentary Structures varies between mottled and wispy, high-amplitude stylolites. Fossils tr, nonexistent in lower 8 m of unit, become more abundant in uppermost 2 m of unit, 5% ossicles, one orthoconic nautiloid 8 m abu, tr (<1%) well-preserved stromatoporoids, more tabular in shape, but some convex-up growths, some overturned but most in place, <1% colonial corals. Solitary corals are very rare, 4 found approx 8 m abu, 3 clustered together, approx 1.5 cm diameter, tr brachs, 2

about 8 m abu, tr chain corals-(possibly *Catenipora*). Misc unit fractured into clasts about 0.4 m in size. Bitumenous odour when struck. Bed of white concretions from 6.9 to 7.5 m abu (similar to those in unit Ea2). The second bed contains white concretions 9 m abu, joint surfaces have subvertical slickensides lined w/ dolomite. Eb8 Sample/Slab/Thin Section Description fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles, high-amplitude (to 2 mm) stylolites com form boundaries of dolomitic mottles, composition; 10% intraclasts to 10 mm in size composed of pelmicrospar/spar, 13% fossils consist of 10% shell frags (probably ostracods), 1 gastropod, 1 ostracod, 1% brach and brach frags (1 plicated brach is 5 mm wide), one (1%) solitary coral (3.5 mm in diameter), tr ossicles, 18% peloids (75 μ m modal size), 10% microspar, 15% mainly f xyn spar, 2% bitumen, 2% white silica spherules to 2.5 mm in size replace carbonate, 25% f-m xyn dolomite (40 μ m mode) is concentrated in dolomitic mottles, composite spar replaces some dolomite rhombs (calcified dolomite). 5% porosity (1% along stylolites and 4% between xtals, interxyn porosity is especially high near stylolites). FLUOR; white fluorescent spar fills ostracods. Rock Name: mottled dolomitic/intraclastic/ microsparitic stromatoporoidal biopelsparite. Eb8b Sample/Slab Description (solitary coral taken 8 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; high amplitude (to 3 mm) stylolites form the boundaries of dolomitic mottles, composition; 20% tabular stromatoporoids to 80 mm long and 20 mm thick, 2% favositid coral frags (1 frag is 24 mm long), 1 solitary coral, 1% articulated ostracods, 45% microspar, 10% spar fills fractures and articulated ostracods, 5% white silica partly replaces fossil frags, 2% interxyn shiny black bitumen, occurs preferentially in dolomitic mottles, 10% f-m xyn dolomite is concentrated in dolomitic mottles, 5% interxyn porosity. CL; dull red-luminescent dolomite, tr bright orange-luminescent vug-filling spar, however, calcite is mainly non-luminescent. Rock Name: mottled dolomitic/sparry/stromatoporoidal biomicrosparite. Sample Eb8a (conodont sample).
BASE OF UNIT 8.05 TOP OF UNIT 18.05 THICKNESS 10.00

UNIT E9. Rec covered interval.

BASE OF UNIT 8.05 TOP OF UNIT 26.40 THICKNESS 18.35

UNIT Ec10. Weathering Character semi-prom, poorly exposed, partly covered by scree, steep and inaccessible. Colour WS-mottled as for unit Eb8, FS-no lt brown mottles. Basal Contact covered by snow, probably equivalent to top of Eb8 or E9. Bedding Character large scale planar, small scale irregular. Bed Thickness min 8 cm, max 50 cm, mode 15 cm. Composition dolomitic ls, carb films on bedding surfaces, <0.1 mm xtal size. Sedimentary Structures lt brown, mottles are elongate parallel to bedding, size variable, irregular, some mottles wispy or wavy. Fossils <1% orthoconic nautiloids (one is 2.5 by 7 cm w/ well-preserved sutures), 5% ossicles, 1% poorly preserved stromatoporoids (more calc than the rest of rock), both in and out of place, one is 6 cm across, 4 cm high and bun-shaped. 1% colonial corals (17 cm wide by 2.5 cm high), tabular, 0.5 m abu, both in and out of place, some with bitumen filling the central corallites. Misc highly fractured w/ numerous calc veinlets, bitumenous odour upon striking. Ec10 Sample/Slab/Thin Section Description (of stromatoporoid and litho sample taken 2 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; 20% irregular calc dolostone mottles, low-amplitude stylolites form boundaries of calc dolomitic mottles, composition; 3% intraclasts (one is 5 mm long), 46% fossils, consist of 5% ossicles, 1% bryozoans, 15% ostracods (many articulated and most <1 mm in size), <1% gastropods filled w/ pelmicrospar, 1 green algal(?) frag, 5% undifferentiated shell frags, 3% favositid corals (one 2 cm spheroidal specimen), 15% stromatoporoids, 1 solitary coral (1.5 mm diameter), 1% ossicles. 5% peloids composed of microspar (mainly in fossils), 16% microspar between peloids, 10% spar fills corallites and fractures, 1% white silica partly replaces favositid coral walls, 25% f-m xyn dolomite (50 μ m mode), minor calcification, dolomite is concentrated in mottles. 5% porosity between xtals/gns and along stylolites. Misc spar fills vertical fractures related to offsets due to dissolution along stylolites. CL; non-luminescent except for 1% moderate blue-luminescent fluorite after dolomite. FLUOR; fluorescent spar fills ostracods. Rock Name: mottled dolomitic/sparry biomicrosparite. Ec10a Sample/Slab/Thin Section Description (of an in-situ favositid coral 2 m abu), fresh surface

colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles and low-amplitude stylolites, composition; 100% favositid coral, corallites are 5 mm in size and filled w/ 40% spar (to c xyn), 1% interxyn bitumen, 54% dolomite rhombs replace corallites, rhombs to 100µm in size, calcified dolomite is very com, m xyn dolomite fills corallites, 5% interxyn porosity. CL; calcite is non-luminescent except for 5% complexly-zoned orange-luminescent spar filling corallites, dolomite luminesces a very dull red except for tr moderately blue-luminescent fluorite after dolomite. FLUOR; white fluorescent overgrowths on spar filling corallites. Rock Name: mottled dolomitic/sparry favositid coral.
BASE OF UNIT 26.40 TOP OF UNIT 29.80 THICKNESS 3.40

UNIT Ec11. Rec covered interval.

BASE OF UNIT 29.80 TOP OF UNIT 31.40 THICKNESS 1.60

UNIT Ec12. Same composition as unit Ec10. Fossils same as Ec10 but contains brachs and gastropods as well. One 1 cm-sized plicated brach sampled. Tr (<1%) gastropods, one is 1.5 cm wide. Ec12 Sample/Slab/Thin Section Description fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles, low-amplitude stylolites accentuated by dk residue, composition; 41% fossils, consist of 1% articulated ostracods to 1 mm in size, 20% ostracod shell frags, 10% ossicles (many dolomitized), 1% brach frags, 1 plicated 1 cm wide brach valve, 10% undifferentiated bioclastic debris, tr bryozoan frags, 5% peloids, 5% micrite, 16% microspar, 5% spar, 1% white silica spherules to 4 mm in size, 2% interxyn bitumen, 20% f-m xyn dolomite (50µm mode) concentrated in dolomitic mottles, est 2% lt brown mainly clay-sized inclusions, minor calcified dolomite, 5% porosity along fractures and between xtals/gns. CL; non-luminescent except for tr amounts of moderately blue-luminescent fluorite after dolomite. FLUOR; spar filling vugs displays fluorescent zonation. Rock Name: dolomitic ostracodal biomicrosparite. E12a Sample/Slab/Thin Section Description (taken 1 m abu, contains a gastropod and a 2.1 cm long echinoderm stem frag), fresh surface colour; wk vdk olive-brown (10YR 3/2), low-amplitude stylolites, tr algae, 1% partly silicified brachs, 2% articulated ostracods (<1 mm in size), 10% ostracod valve frags, 3% ossicles, 1% *Catenipora*. 30% peloids (size mode 100µm), 10% micrite, 13% microspar, 15% spar (fills fractures and articulated ostracods and occurs between peloids), 1% interxyn bitumen, 5% white silica, 2-3 silicified brach and ostracod valves, stylolites w/ concentration of dk brown residue, 5% dolomite com contains microspar/spar inclusions. 5% porosity (2% along fractures and 3% between xtals). CL; non-luminescent except for 1% moderately blue-luminescent fluorite after dolomite, some of which is concentrated in ossicles. FLUOR; spar filling vugs and ostracods is fluorescent. Rock Name: mottled micritic/microsparitic/ sl dolomitic/ostracodal biopelsparite.

BASE OF UNIT 31.40 TOP OF UNIT 33.90 THICKNESS 2.50

UNIT E13. Rec covered interval.

BASE OF UNIT 33.90 TOP OF UNIT 37.15 THICKNESS 3.25

UNIT Ed14. 1,392 m west of Lancaster Sound. Weathering Character semi-prom, good exposure, 2 m wide by 2.6 m high. Colour WS m-dk gy w/ minor lt brown and wispy mottles. FS m-dk grey aa, mottled. Basal Contact covered. Bedding Character large scale planar, small scale irregular. Bed Thickness min 3 cm, max 25 cm, mode 7 cm. Composition calc dolostone, modal xtal size 0.25 mm. Sedimentary Structures mottled, 20% lt mottles, 80% dk mottles. Fossils stromatoporoid-grown on coral, colonial corals-one small chain coral, a few favositids, 5% ossicles, brach shell frags. Misc small outcrop of mottled(?) dolostone on south side of stream from 1,650 m to 1,754 m from Lancaster Sound, but mostly covered.
BASE OF UNIT 37.15 TOP OF UNIT 39.75 THICKNESS 2.60

UNIT Ee15. At 1,920 m outcrop Ee on north side of stream is correlative w/ Ed14. Starting to measure 5.85 m horizontally below the top of Ed14. There is no exposure between Ed14 at 1,392 m and Ee15 at 1,876 m. Weathering Character prom, outcrop is 65 m long and 8 m wide, bedding plane surfaces are exposed in a step-like fashion. Colour WS m-dk grey w/

minor lt brown and wispy mottles. FS m-dk grey and mottled, 40% lt, 60% dk mottles. Basal Contact covered. Bedding Character large scale planar, irregular on scale of mottles. Bed/Lam Thickness min 5 cm, max 30 cm, mode 15 cm. Composition calc dolostone, xtal size approx 0.1 mm. Sedimentary Structures mottles (both vertical and horizontal). Fossils approx 1% colonial corals, large ones in place, small ones both overturned and in place, one is 70 cm long and 13 cm high 2 m abu, isolated favositid corals w/ central corallites filled w/ bitumen, another is about 2 m wide and 15 cm high, <1% orthoconic nautiloids, one at base is 8 cm long and 3 cm wide, another is 20 cm long and 2.5 cm wide, ossicles are locally abundant to 20% on some bedding plane surfaces (avg 3-5%), one echinoderm stem is 2.5 cm long (0.25 m abu), tr gastropods, 1 on bedding surface 2.25 m abu is planispiral and 10 cm in diameter, approx 1% stromatoporoids, a large 20 cm wide in-place bun-shaped specimen 0.25 m abu. Eel5 Sample/Slab/Thin Section Description (taken 2.25 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; 35% dolomitic mottles bounded by low-amplitude stylolites accentuated by brown residue, 37% fossils, 10% ossicles and one echinoderm stem (1 mm wide and 4 mm long), 15% ostracod shell frags, 10% m-spined gastropods to 30 mm high, 15% poorly defined peloids composed of microspar, 5% micrite, 18% microspar, 4% spar, 1% interxyn bitumen, 15% f-m xyn dolomite (mode 50 μ m) concentrated in dolomitic mottles. 5% porosity is distributed as 2% along fractures, 1% along stylolites, and 2% between xtals/gns. CL; tr moderate blue-luminescent fluorite after dolomite. Most of the dolomite, however luminesces a very dull red, the calcite is non-luminescent except for bright orange-luminescent spar veinlets. Rock Name: mottled dolomitic/sl sparry/sl micritic biopelmicrosparite. E15a Sample/Slab Description (taken at base of unit), of 11 cm-sized *Catenipora* colony, fresh surface colour; wk dk olive-brown (10YR 4/2), composition; *Catenipora*, 45% f-c xyn spar fills corallites, 50% f-m xyn dolomite occurs between corallites, 5% interxyn porosity. Rock Name: sample of 11 cm wide *Catenipora* colony. Misc bitumenous odour.

Unit Eel5 continued on north side of creek. Outcrop Eel5 on north side starts at 1941 m and continues to 2,040 m from Lancaster Sound. Fork at creek occurs at 2080 m. Fossils favositid(?) colonial corals to 1 m wide by 15 cm high occur 2.25 m abu. Overturned favositid coral 10 cm wide-on its side approx 2.25 m abu. Orthocones and gastropods also present. One very small (3 mm diameter) solitary coral, approx 2.25 m abu. Ossicles in lt mottles occur w/ the same percentage in the dk mottles. Orthocones-one at 2.75 m abu is at right angles to bedding, large one 5 cm in diameter and 14 cm long is situated about 1.25 m abu. Brachs-at 2,038 m on south side of stream. Misc dip is 2°E. Two joint surfaces occur approx at right angles to each other in outcrop, calcite com on joint surfaces.

BASE OF UNIT 33.90 TOP OF UNIT 39.75 THICKNESS 5.85

UNIT Eel16 Description as for Eel5. E16 Thin Section Description fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles and low-amplitude stylolites, composition; 5% rd intraclasts (2 mm mode), 25% ostracod shell frags, 2% ossicles, and one small green algal(?) frag, 32% peloids are composed of microspar. Orthocones include 5% micrite, 6% microspar, and 5% spar, 2% polyxyn quartz partly replaces fossil frags, 15% f-m xyn dolomite, calcified dolomite is com. Sample porosity is 5% mainly between xtals/gns. CL; dolomite luminesces a uniform, very dull red except for rare blue-luminescent fluorite after dolomite, calcite is non-luminescent except for bright orange-luminescent subvertical veinlets. FLUOR; zoned spar fills ostracods. Rock Name: dolomitic/sl intraclastic/sparry/micritic ostracodal biopelmicrosparite. Misc dip is 2°E at top of unit (45.35 m asl).

BASE OF UNIT 39.75 TOP OF UNIT 45.35 THICKNESS 5.60

UNIT E17. Rec covered interval.

BASE OF UNIT 45.35 TOP OF UNIT 51.95 THICKNESS 5.60

UNIT Eel18. Outcrop on north side of valley is 13.25 m high and occurs from 2,314 m to 2,366 m from Lancaster Sd. Description as for Eel5. Composition calc dolostone. Fossils numerous but <1% chain corals 6.60 m abu (sampled). A few solitary corals 8.0 m abu. Misc

white irregular concretions in a zone 0.60 m thick 8.25 m abu. Eg18 Sample/Slab/Thin Section Description (litho sample w/ 'concretions' taken 8.25 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles bounded by stylolites, composition; 14% fossils, one overturned 80 mm wide favositid coral, 5% of skeleton is replaced by chert, some corallites filled w/ polyxyn quartz, others w/ length-slow chalcedony, tr *Catenipora* 7 mm long, 1% ostracods, 2% stromatoporoids (one is 30 mm in size), 1% monaxon sponge spicules. 10% peloids, some occur as part of geopetal structure in corallites i.e. peloids at base of corallites are overlain by spar. 40% microspar, 10% spar, 1% bitumen, 20% f-m xyn dolomite (50 μ m modal size), extensive calciified dolomite. 5% porosity along stylolites and between xtals/gns. CL; non-luminescent except for dull red luminescent dolomite. FLUOR; fluorescent-zoned spar fills corallites. Rock Name: dolomitic/ostracodal biopelmicrosparite. E18a Sample/Slab Description (chain coral taken 6.6 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, composition; *Catenipora* 12 cm in size, 52% spar fills corallites, 3% interxyn bitumen, 5% white chert replaces part of coralline wall structure, 35% f-m xyn dolomite between walls, also parts of the walls are replaced by dolomite. 5% interxyn sample porosity. Rock Name: *Catenipora* consists of mottled dolomitic sparite.
BASE OF UNIT 51.95 TOP OF UNIT 65.20 THICKNESS 13.25

The top of E18 is taken as the contact between the Baillarge and Cape Crauford formations.

UNIT E19. Rec covered interval across from Ee15 on south side of stream.
BASE OF UNIT 39.75 TOP OF UNIT 58.75 THICKNESS 19.0

60.0 m in section Ea is taken to be equivalent to 61.5 m in section Eb.

UNIT Eh20. Weathering Character prom good exposure, Colour WS and FS-m grey. Basal Contact covered. Bedding Character parallel thinly bedded to interlam, dk greyish brown and buff, locally brecciated (mainly mosaic but w/ rubble breccia veins). Bed Parting Thickness-min 1 cm, max 15 cm, mode 3 cm. Composition dolostone, xtal size approx 0.1 mm. About 15% of unit consists of grey intraclasts (max 15 mm long, most of which are elongate, mode 5 mm long, 1 to 3 mm wide). Locally mosaic to rubble breccia. Sedimentary Structures vague normal grading of intraclast size, lams wavy (possibly ripple marks), minor bioturbation. Eh20 Sample/Slab/Thin Section Description (litho sample taken about 1 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; interlam to thinly interbedded intraclastic-rich and poor lams/beds, intraclasts to 30 mm long, elongate parallel to bedding, composition; 20% intraclasts composed of dolomitic f xyn spar, 5% undifferentiated bioclastic debris, tr ossicles. 5% micrite, 5% microspar, 'matrix' is sparry f-m xyn dolostone, 60% f-m xyn dolomite dispersed in lams, calcified dolomite com. 5% sample porosity along stylolites and between xtals/gns. CL; entirely non-luminescent. Rock Name: intraclastic/sl fossiliferous f-m xyn dolostone.
BASE OF UNIT 58.75 TOP OF UNIT 60.35 THICKNESS 1.60

UNIT Eh21. Weathering Character semi-prom. Colour WS and FS-m brownish grey. Basal Contact abrupt planar. Bedding Character vaguely defined dk lams. Bed/Lam Thickness mode 1 mm (poorly defined). Composition calc dolostone, xtal size 0.1 mm, 1% irregularly-shaped vugs to 1.5 cm in size, separated by about 3 to 4 cm. Fossils 2-3% brachs to 8 mm in size, shell thickness 0.4 mm, rhynchonellids(?) lined w/ dolomite, minor moderately well-preserved stromatoporoids, ostracods appear in thin zone 5 cm thick 0.85 m abu, are up to max 10 mm long, mode 4 mm. Misc well indurated, some small subvertical carbonate veinlets. Bituminous odour upon striking. Eh21 Sample/Slab/Thin Section Description (litho sample contains a few brachs 0.3 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites w/ very minor dolomitic mottles, composition; 15% intraclasts to 5 mm long, composed of pelmicrospar or microspar, 30% articulated and disarticulated plicated rhynchonellid brachs to 1 cm wide, wall structure well preserved, 15% peloids are composed of microspar, especially inside articulated brachs. 15% microspar, 14%

spar fills brachs, 1% white silica partly replaces brach valves, 5% f-m xyn dolomite (mode 40 μ m) is mainly dispersed but some dolomitic mottles occur along low-amplitude stylolites, calcified dolomite com. 5% porosity along fractures, stylolites and vugs between articulated brach valves. CL; 15% bright orange-luminescent calcite, mainly in fossil frags, 1% blue-luminescent fluorite after dolomite. FLUOR; fluorescent spar lines corallites. Rock Name: sl dolomitic/intraclastic brachiopodal biopelmicrosparite. E21a Sample/Slab Description (ostracod sample taken 0.85 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; dolomitic mottles, composition; 2% smooth ostracods to 7 mm in size, 72% microspar, 1% bitumen, 20% f-m xyn dolomite (50 μ m mode) concentrated in mottles. 5% porosity. Rock Name: mottled dolomitic microsparite.
BASE OF UNIT 60.35 TOP OF UNIT 62.75 THICKNESS 2.40

UNIT Eh22. Weathering Character prom. Colour WS & FS-interlam m buff and dk gy lams. Basal Contact abrupt, sl wavy (wavelength 20 mm, amplitude 5 mm). Bedding Character interlam m buff and dk gy lams. Bed/Lam Thickness mode 1-2 mm. Composition dolomitic ls, xtal size <0.1 mm. Sedimentary Structures hummocky structures, wavelength 40 cm, amplitude 2 cm. Misc well indurated, bitumenous odour. E22 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; interlam wk xlt yellowish orange (10YR 8/2) and wk dk olive-brown (10YR 4/2), sedimentary structures; contorted stratification(?), composition; 40% peloids (composed of microspar) range from 50 to 200 μ m, mode is 100 μ m. 5% f xyn spar, 10% moulds of blade-shaped xtals the long-axes of which are at a high angle to bedding, some f xyn spar replaces blade-shaped xtal moulds, 40% vf-f xyn dolomite (25 μ m mode) occurs around peloids, calcified dolomite is very com. 5% porosity along stylolites and as lath-shaped xtal moulds. CL; 20% bright orange-luminescent composite spar after gypsum xtals. Rock Name: evaporite xtal mouldic dolomitic pelsparite.
BASE OF UNIT 62.75 TOP OF UNIT 63.05 THICKNESS 0.30

UNIT Eh23. Weathering Character prom. Colour WS-buff and m dk gy (breccia), FS-lt to m grey. Basal Contact abrupt, convex-up (wavelength 10 cm, amplitude 1 cm), irregular on a small scale. Bedding Character mosaic breccia. There is a 3 cm thick unbrecciated lam zone in center of unit. Bed/Lam Thickness 1 to 2 mm thick lams in unbrecciated zone. Composition clast-supported breccia (70% 'clasts', 20% 'matrix'). Clast size max 30 mm, min 2 mm, mode 10 mm, ungraded, clasts are randomly oriented, sbang except at top of bedded part and are subparallel w/ each other. Interclast porosity approx 10%, good permeability. Sedimentary Structures high-amplitude stylolites at top of breccia. Misc breccia is laterally continuous for 4 to 5 m. E23 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; planar to sl wavy lams in unbrecciated part, basal 40 cm and upper 15 cm of sample is crackle breccia, high-amplitude (to 3 mm) stylolites, evidence of considerable dissolution where basal breccia clasts are now 'lodged' in an overlying 25 mm thick unbrecciated lam zone, boundaries between some rotated clasts and unbrecciated lam unit are stylolites, subvertical fractures terminate at stylolites, vugs between clasts range to 1 cm in size, composition; 25% porosity, breccia clasts are composed of microsparite/f xyn sparite, clast size min 2 mm, max 10 mm, mode 7 mm, 'matrix' between 'clasts' is f xyn sparite, 5% f xyn dolomite. Rock Name: m calcirudite-sized breccia; sl dolomitic/microsparitic/f xyn sparite 'clast' f xyn sparite 'matrix' crackle (stylo-) breccia.
BASE OF UNIT 63.05 TOP OF UNIT 63.14 THICKNESS 0.09

UNIT Eh24. Weathering Character prom. Colour WS and FS-m grey. Basal Contact abrupt planar. Bedding Character faintly-defined planar lams/beds. Bed/Lam Parting Thickness min 4 cm, max 20 cm, mode 8 cm. Composition calc dolostone (dolarenite?), gn/xtal size 0.2 to 0.3 mm. E24 Sample/Slab Description (rep litho sample taken 3.3 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low-amplitude stylolites, composition; 59% microspar, 1% composite f xyn spar pseudomorphic after gypsum xtals (to 0.5 mm in size), 35% f xyn dolomite is evenly dispersed and calcified dolomite is com. 5% porosity along stylolites and between xtals/gns. CL; non-luminescent except for 1% composite spar w/ bright orange-luminescent overgrowths. Rock Name: dolomitic microsparite.

BASE OF UNIT 63.14 TOP OF UNIT 66.74 THICKNESS 3.60

The top of E24 is taken as the contact between the Baillarge and Cape Crauford formations.

UNIT Eh25. Weathering Character prom. Colour WS & FS-m grey (breccia). Basal Contact obscured by scree. Bedding Character breccia. Composition clast-supported crackle breccia. 70-80% clasts are calc dolostone, 15% vugs, clast size variable (1 cm mode?). 5-15% calc 'matrix', numerous high-amplitude stylolites. Sedimentary Structures high-amplitude (to 2 cm) stylolites are abundant throughout unit and define a lineation at right angles to bedding. Fossils none. Misc well indurated, bitumenous odour. E25 Sample/Slab/Thin Section Description (rep litho sample of breccia contains many stylolites), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; very high amplitude and numerous stylolites, composition; 35% microspar, 25% f xyn spar, 1% brown residue along stylolites, 25% vf xyn dolomite and f xyn relict dolomite, very extensively calcified dolomite, 15% porosity along stylolites/fractures and between clasts, 80% clasts (min size 2 mm, max 20 mm, mode 7 mm). CL; 2% bright orange-luminescent composite spar after gypsum xtals, 'matrix' between clasts is dull orange-luminescent clear spar. Rock Name: dolomitic sparry microsparite 'clast' crackle (stylo-) breccia.

BASE OF UNIT 66.74 TOP OF UNIT 67.24 THICKNESS 0.50

UNIT Eh26. Rec covered interval.

BASE OF UNIT 67.24 TOP OF UNIT 68.49 THICKNESS 1.25

UNIT Eh27. Weathering Character prom. Colour WS-lt greyish brown, FS-m brown. Basal Contact obscured by scree. Bedding Character planar lam. Bed/Lam Thickness lams faintly defined, about 1.0 cm mode. Composition dolomitic ls, xtal size 0.2 mm, 2% mm-sized pores. Sedimentary Structures planar lams. Fossils many frags on bedding plane surfaces, frag modal size 2.0 mm, are darker coloured, tr 1 cm-sized frags of brachs or ostracods. E27 Sample/Slab/Thin Section Description (litho sample taken 1.95 m abu), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; low-amplitude stylolites, composition; 30% intraclasts to 6 mm in size, 2% undifferentiated shell frags, 45% peloids (composed of microspar), 12% microspar and 5% f to m xyn spar between peloids/intraclasts, 1% bitumen, 5% f xyn dolomite (mode 30µm) dispersed and in small patches along stylolites, minor calcified dolomite. 5% porosity along stylolites and between xtals/gns. CL; non-luminescent except for very dull luminescent dolomite. Rock Name: sl dolomitic/sl sparry peloidal intramicrosparite. Sample Eh27a taken for conodonts.

BASE OF UNIT 68.49 TOP OF UNIT 70.84 THICKNESS 2.35

UNIT Eh28. Weathering Character prom. Colour WS and FS-variable buff and m dk gy patches. Basal Contact abrupt planar. Bedding Character breccia w/ coated clasts. Composition dolomitic ls coated 'clast' sparite 'matrix' breccia, 5% small vugs. Sedimentary Structures 70% coated clasts, mode 3 cm, max 7 cm. Misc plunge of syncline is 36°S, strike is EW. Eh28 Sample/Slab/Thin Section Description (rep litho sample taken at top of unit contains coated clasts), fresh surface colour; coated clasts are wk vdk olive-brown (10YR 3/2) in a wk vlt yellowish orange (10YR 7/2) 'matrix', sedimentary structures; vugs to 2 cm in size, low-amplitude stylolites, composition; 60% coated breccia clasts, coatings on clasts comprise 20% of rock and consist of clotted microsparite/sparite, minor porosity, tr one poorly preserved ostracod ghost, 40% peloids composed of microspar. 50% f and m xyn spar, tr white silica, 25% f xyn dolomite (mainly between coated clasts), very extensive calcification of dolomite between coated clasts, also extensive porosity com where leaching of calcite has occurred. Note: dissolution of calcite probably caused the brecciation. Porosity is distributed as 10% vugs to 2 cm in size and 5% between xtals/gns. Rock Name: dolomitic/sparry coated clast breccia. Misc units Eh20-28 were measured on the limb of a plunging anticline. The interval between outcrop Eh and Ej is mainly covered and therefore difficult to correlate. Unit Eh25 breccia is traceable in major outcrop Ei on eastern limb of a plunging anticline. (plunge is 12°N, limb dips 30°E). Stream has formed along crest of anticline. Ej breccia is

thicker than in outcrop Ei which is near crest of anticline and slickensides on bedding plane are perpendicular to the axis of the anticline. Base of Ej is approx equal to bioturbated unit Ee15. There is a 6 m thick mottled unit between 2,225 m and 2,261 m west of Lancaster Sound. At 6.0 m abu the mottle size decreases.

BASE OF UNIT 70.84 TOP OF UNIT 71.64 THICKNESS 0.80

The base of unit Ej29 is taken as approx 29.7 m above the top of unit Ee15 (equivalent to the top of Ee14).

UNIT Ej29. Mottled calc dolostone,

BASE OF UNIT 39.75 TOP OF UNIT 45.75 THICKNESS 6.00

UNIT Ej30 Weathering Character semi-prom. Colour WS-dk grey and m brownish grey mottles. FS-m to dk grey. Basal Contact trans over 10 cm from mottles 2 cm in size to smaller 1 cm-sized mottles. Bedding Character mottles are elongate parallel to bedding. Bed Thickness massive. Composition dolomitic ls (xtal size 0.1 to 0.2 mm) w/ spar veinlets. Sedimentary Structures mottles. Fossils tr randomly oriented orthoconic nautiloids, 2-3% brachs at base increase up-section to 5%, weather out but are poorly preserved, <1% gastropods weather out, 1-3 cm in size, not well preserved. Misc bitumenous odour, fairly permeable, calcite veinlets cross-cut bedding. Ej30 Sample/Slab Description (rep litho sample w/ brachs taken near top of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, composition; 10% plicated articulated and disarticulated brachs to 8 mm in size, articulated ones are filled w/ microspar and pelspar. 15% microspar, tr spar, 70% f-m xyn dolomite. 5% interxyn porosity. Rock Name: brachiopodal microsparitic f-m xyn dolostone. Sample Ej30a taken for conodonts.

BASE OF UNIT 45.75 TOP OF UNIT 47.65 THICKNESS 1.90

UNIT Ej31. Rec covered interval.

BASE OF UNIT 47.65 TOP OF UNIT 55.15 THICKNESS 7.50

UNIT Ej32. Weathering Character semi-prom. Colour WS-variably interlam, m brownish grey and dk grey. FS-lt to m grey. Basal Contact covered. Bedding Character interlam m brownish grey and dk grey laterally continuous lams 'pinch and swell'. Bed/Lam Thickness min 1.0, max 4.0, mode 3.0 mm, good bedding plane parting. Composition dolostone w/ 0.1 to 0.2 mm xtal size, small vugs <1% resemble brach valve moulds to 1 cm in size. Sedimentary Structures planar lams. Misc subvertical slickensides, bitumenous odour, joint faces are lined w/ spar. Ej32 Sample/Slab/Thin Section Description (rep litho sample taken near top of unit), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; moderate bioturbation (subvertical 'tubes' to 4 mm in diameter cross-cut vague lam), composition; 1% f xyn spar patches along fractures, 89% f xyn dolomite (50µm mode), porous areas contain corroded dolomite rhombs, 10% interxyn porosity. CL; non-luminescent. Rock Name: mottled f xyn dolostone.

BASE OF UNIT 55.15 TOP OF UNIT 55.90 THICKNESS 0.75

UNIT Ej33. Weathering Character prom. Colour WS and FS-m brown. Basal Contact abrupt planar. Bedding Character vague laterally continuous planar bedding, irregular on a small scale. Bed Thickness min 5 cm, max 20 cm, mode 10 cm. Composition dolomitic ls w/ some spar veinlets, microxyn, small bitumenous flakes. Sedimentary Structures lam as described, some subvertical slickensides, vague bituminous lams, though massive beds in between. Ej33 Sample/Slab/Thin Section Description (rep litho sample taken 2.0 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, misc; extensively fractured, composition; 39% peloids (composed of microspar), size ranges from 25 to 75µm, mode 50µm, 10% microspar between peloids, 20% microspar between peloid clusters, 1% bitumen fills fractures, 25% f xyn dolomite (50µm mode) is concentrated near stylolites and in dolomitic mottles, extensive calcification of dolomite, 5% porosity along fractures, stylolites and between xtals/gns. CL; excellent examples of bright

orange-luminescent subvertical fracture-filling spar. Gypsu xtals (pseudomorphed? by composite bright orange-luminescent spar) occur only alongside fractures. This constraint requires that the gypsum was formed at the same time as or after the fractures. Rock Name: dolomitic pelmicrosparite.

Sample Ej33a taken for conodonts.

BASE OF UNIT 55.90 TOP OF UNIT 58.90 THICKNESS 3.00

UNIT Ej34. Rec covered interval 2,402 m from Lancaster Sound.

BASE OF UNIT 58.90 TOP OF UNIT 60.40 THICKNESS 1.50

UNIT Ej35. Weathering Character semi-prom, litho as for Ej33 except that there is a pod of breccia on top, small outcrop 3 m long and 0.6 m high. Composition breccia clasts min 2 mm, max 10 mm, mode 5 mm, subequant, sbang to ang. Sedimentary Structures high-amplitude stylolites. Ej35 Sample/Slab Description (taken of breccia 0.5 m abu), fresh surface colour; m olive-brown (10YR 5/3) 'clasts' in a vlt yellowish orange (10YR 7/3) 'matrix', sedimentary structures; very high amplitude (to 20 mm) stylolites, composition; 15% porosity along stylolites and between clasts, 85% breccia clasts are composed of microsparite/f xyn sparite, min size 2 mm, max size 15 mm, mode 7 mm. Rock Name: m calcirudite-sized microsparite/f xyn sparite 'clast' crackle breccia.

BASE OF UNIT 60.40 TOP OF UNIT 61.00 THICKNESS 0.60

UNIT Ej36. Rec covered interval.

BASE OF UNIT 61.00 TOP OF UNIT 62.85 THICKNESS 1.85

UNIT Ej37. Description as for Ej33 except as noted. Basal Contact covered. Bedding Character faintly lam, more massive, unfossiliferous, good fracture porosity and permeability, subvertical fractures filled w/ carbonate. Bed Thickness min 3 cm, max 25 cm, upper part more fractured. Composition; breccia. Sedimentary Structures; high-amplitude stylolites occur in a 30 cm zone immediately below the breccia. Misc fault w/ 30 cm apparent offset.

BASE OF UNIT 62.85 TOP OF UNIT 63.65 THICKNESS 0.80

UNIT Ej38. Weathering Character rec. Colour WS and FS-buff. Basal Contact abrupt where unbrecciated to trans in brecciated interval. Bedding Character faintly visible, laterally changes to breccia, lam to bedded. Bed/Lam Thickness min 0.3 cm, max 3.0 cm, mode 1.0 cm. Composition dolostone w/ 0.2 mm xtal size, recrystallized, minor breccia 'lens' about 4 m long, laterally traceable into unbrecciated unit. Breccia occurs on both sides of a fault (PEj37/38) and consists of 60% clasts and 40% matrix/porosity. Clast size min 1.5 cm, max 16 cm, mode 10 cm. Sedimentary Structures faintly lam, high-amplitude stylolites, laterally grades into breccia, planar lams. Ej38 Sample/Slab/Thin Section Description (rep litho sample of lam part of unit taken near top of unit), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; vague planar lam/thin bedding, composition; 1% f xyn dolospar after gypsum xtals to 0.5 mm long, 94% f xyn dolomite, 5% porosity. CL; a uniform dull red luminescence. Rock Name: f xyn dolostone.

BASE OF UNIT 63.65 TOP OF UNIT 64.15 THICKNESS 0.50

UNIT Ej39. Weathering Character prom. Colour WS-m brownish gray w/ yellowish green mottles. FS-m brownish grey. Basal Contact convex-up structures. Bedding Character fractured but is massive at base of unit, locally brecciated. Bed Thickness basal 1.8 m is massive. For the overlying 0.8 m-min 1.0 cm, max 15.0 cm, mode 2-3 cm. Composition is w/ pore-filling bitumen, modal xtal size 0.2 to 0.3 mm, 1-2% vugs. Local breccia, 70% clasts, 30% porosity, some clasts juxtaposed, therefore not moved far, possess very good porosity, some clast moulds. Clast Description-min 3 cm, max 50 cm, mode 10 cm, many clasts are ang and appear to be rotated wrt bedding. Fossils one orthocone, 4-5% in place stromatoporoids, tr solitary corals (some in place, some overturned), Sedimentary Structures high-amplitude stylolites, convex-up structures more dramatic in breccia. Misc bitumenous odour, top part of unit contains carb lams and is more fissile. Ej39 was traced the full length of the outcrop in

order to define brecciated and non-brecciated parts. At 2,338 m-2,342 m-fractured or crackle breccia, 2,342 m-2,345 m-lower metre is brecciated, modal clast size is 5 cm, upper part still bedded, 2,345 m to 2,359 m is fractured but bedded, 2,359 m to 2,365 m-covered interval, 2,365 m to 2,421 m-bedded, some convex-up structures, 2,397 m-slickensides perpendicular to valley, 2,400 m-vertical slickensides/high-amplitude stylolites, 2,402 m-fault in vicinity-vertical carbonate veins, 2,407 m-breccia in pod, 2,421 m-2,448 m non-brecciated part of unit. E39 Sample/Slab Description (solitary corals throughout unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, dolomitic mottles, composition; 3% solitary corals (12 mm diameter), tr ostracods. 77% microspar, 5% spar along fractures, 2% white silica partly replaces solitary coral and brach? valves. 10% f xyn dolomite (50µm mode) is concentrated along stylolites and in dolomitic mottles. 5% interxyn porosity. Rock Name: mottled dolomitic microsparite. Ej39a Sample Description (brachs taken 1 m abu) contains brach frags, one plicated rhynchonellid brach 1 cm wide and one solitary coral frag. E39b Sample/Slab Description (litho sample w/ mottles), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 79% microspar, 5% spar, 1% bitumen, 10% f xyn dolomite, dispersed and also concentrated in mottles, 5% sample porosity between xtals/gns and along stylolites. Rock Name: mottled dolomitic microsparite.
BASE OF UNIT 64.15 TOP OF UNIT 66.75 THICKNESS 2.60

UNIT Ej40. Weathering Character prom. Colour WS and FS variable buff (coated clasts) and dk grey. Basal Contact abrupt planar on a large scale, irregular on a small scale. Bedding Character irregular. Bed Thickness massive. Composition dolostone, xtal size 0.2 mm, 10-15% vugs appear to be formed by enlargement of fractures. 'Lens' of coated clasts (40%) are from 5-10 cm in size. Sedimentary Structures 'lens' of coated clasts at top of unit, Misc Outcrop Ej is on the west limb of a north-trending non-plunging anticline. Bitumenous odour, unit fractured. Ej40 Sample/Slab/Thin Section Description (rep litho sample w/ coated clasts taken near top of unit), fresh surface colour; mottled wk m olive-brown (10YR 5/2) and wk xlt yellowish orange (10YR 8/2), sedimentary structures; stylolites are mainly low-amplitude but have thick opaque residues, stylolites form the boundaries of many clasts, misc; many clasts are coated, bounded by stylolites and have highly curved laminae, clasts consist of dolomitic pelsparite and have a clotted to 'wispy' texture, extensive minor fractures, composition; 1 articulated ostracod 3 mm in size, abundant calcified dolomite within and between clasts, dolomite is sl concentrated near stylolites in clasts, originally the rock must have been at least 50% dolomite, now it is about 15% dolomite, 10% sample porosity along fractures, stylolites, and between xtals. CL; dull red-luminescent dolomite, 5% bright orange-luminescent spar occurs between clasts and fills subvertical fractures! Rock Name: coated clast (sl dolomitic pelsparite) breccia.
BASE OF UNIT 66.75 TOP OF UNIT 67.75 THICKNESS 1.00

UNIT E41. Rec covered interval.

BASE OF UNIT 67.75 TOP OF UNIT 75.50 THICKNESS 7.75

UNIT Ek42. Weathering Character semi-prom. Colour WS and FS-variable, breccia, buff and m brownish grey clasts, white carbonate 'matrix', subequal amounts of buff and grey clasts. Basal Contact covered. Composition breccia, buff dolostone 'clasts' are larger than the m brownish grey dolomitic ls 'clasts'. 1-2% bitumenous lams (or pore-filling?), white sparry veins. Buff clasts are elongate or subequant and ang, min 1 cm (40%), max 30 cm, mode 10 cm. M brownish grey clasts (min 2 mm, max 10 cm, mode 2-3 cm). 15% interclast porosity, 15% c xyn spar (to 1 cm). Fossils 3-4% ossicles, approx 1% solitary corals to 3.5 cm in diameter, either in place or on their sides. Less than 1% colonial corals to 10 cm in size, favositid(?) coral, *Catenipora*, tr plicated brachs <1 cm in size, tr bryozoans. Misc bitumenous odour, fractured outcrop. E42 Sample/Slab Description (solitary corals taken 1 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 1% fossils consist of one 17 mm diameter solitary coral, tr brach frags and ossicles, 58% peloids, 10% microspar, 10% f xyn spar between peloids, 1%

very c xyn spar fills fractures, tr bitumen, tr white spherulitic silica, 15% f xyn dolomite is concentrated in mottles, 5% porosity. Rock Name: dolomitic/sparry pelmicrosparite. E42a Sample Description (brach taken 1 m abu), one 5 mm diameter solitary coral. E42b Sample/Slab Description (*Catenipora* taken 2 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), tr malachite stain, composition; 1 favositid coral colony 15 cm in size, skeleton partly replaced by spherulitic silica, corallites lined w/ clear polyxyn quartz and filled w/ m xyn spar, total 35% silica. Rock Name: silicified sparry favositid coral. E42c Sample/Slab Description (favositid coral taken 1 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2), composition; 20% fossils consist of 5% ostracods, tr ossicles, one in situ *Catenipora* (5%) colony 40 mm high and 10% undifferentiated fossil frags. 13% microspar, 2% f xyn spar lines fractures, 60% f-m xyn evenly dispersed dolomite, 5% porosity along fractures and between xtals/clasts. Rock Name: microsparitic fossiliferous f-m xyn dolostone. Ek42d Sample/Slab/Thin Section Description (rep litho sample-spar to 1 cm in size), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, subvertical microfractures, composition; 1% solitary coral is partly replaced by chert, 5% ossicles, 3% ostracods, 2% brachs, partly replaced by chert, 15% ostracod frags, 34% peloids composed of microspar, 20% spar (to vc xyn) fills fractures, 1% spherulitic chalcedony. 15% dolomite after gypsum(?), in part calcified, 5% porosity along stylolites and fractures. CL; bright orange-luminescent subvertical spar veinlets and zoned clear spar fills vugs. FLUOR; spar filling corallites is zoned. Rock Name: dolomitic/sparry/ostracodal biopelmicrosparite.

BASE OF UNIT 75.50 TOP OF UNIT 79.70 THICKNESS 4.20

UNIT Ek43. Very poor outcrop, is lam where exposed.

BASE OF UNIT 79.70 TOP OF UNIT 79.90 THICKNESS 0.20

UNIT E44. Rec covered interval approx 2,400 m west of Lancaster Sound.

BASE OF UNIT 79.90 TOP OF UNIT 88.15 THICKNESS 8.25

UNIT EL45. Weathering Character prom. Colour WS and FS-variable (breccia), buff and m brownish grey 'clasts', white spar 'matrix', subequal amounts of buff and grey clasts. Large spar is yellowish. Basal Contact covered. Composition 70% 'clasts', 15% 'matrix', 15% porosity. Breccia is chaotic, not graded, clasts randomly oriented, both small and large ang to sbang 'clasts'. Clast size-min 2 mm, max 1 m, mode 6 cm. 'Matrix'-1 cm sized yellowish spar xtals. M brownish grey clasts are dolomitic ls to ls. Buff clasts are dolomitic ls, large ones are themselves brecciated. Minor bluish carb veins in outcrop. Sedimentary Structures high-amplitude stylolites. Fossils 2% favositid corals (max 7 cm), some have bitumen filling the central corallites, most are in place in clasts but a few are overturned, ostracods-concentrated in parts of outcrop, are generally <5 mm in size, concentration is 1 m abu where they comprise 10% of unit. They are filled w/ white xyn carbonate, tr small 0.4 cm wide by 1.0 cm long orthoconic nautiloids. Misc slickensides/slickolites w/ lineations trend 10°, plunge 66°N, trend 90°, plunge 65°E. Bituminous odour. EL45 Sample/Slab/Thin Section Description (rep litho sample of breccia taken 1 m abu), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; dolomitic mottles, composition; 41% fossils, 1% orthocones, 35% articulated ostracods to 7 mm in size (most are 2 mm), many have alternating spar and dolomite linings, one articulated ostracod is lined w/ dolomite, then spar and is filled w/ polyxyn quartz, 5% favositid corals (25 mm in size), tr ossicles, 13% microspar, 30% spar fills ostracods, 1% bitumen, 40% f xyn dolomite (xtals are lath-shaped due to differential xtal corrosion) is concentrated in ostracods, also lath-shaped dolomite in irregularly-shaped mottles some of which surround calc areas; very extensive calcification of dolomite, 5% sample porosity along stylolites. CL; moderate orange-luminescent spar lines the inside of articulated ostracods, dolomite luminesces a dull orange-red and limpid dolomite lining ostracods is non-luminescent. FLUOR; a complex calcite-dolomite cement is revealed by fluorescence. Rock Name: mottled fossiliferous microsparitic f xyn dolostone crackle breccia. E45a Sample/Slab Description (ostracod sample taken 1 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), composition; 45% fossils consist of 5% favositid corals to 55

mm in size, corallites filled w/ spar, 35% articulated ostracods to 4.5 mm filled w/ spar, 5% disarticulated ostracod frags, 40% spar fills ostracods, corallites of favositid corals, and occurs between fossils, 50% f xyn dolomite (mode 40 µm) between fossil frags, dolomite also lines spar-filled ostracods, in some cases there are alternating spar and dolomite linings filling ostracods, 5% interxyn porosity. Rock Name: ostracodal f xyn dolostone.

BASE OF UNIT 88.15 TOP OF UNIT 94.15 THICKNESS 6.00

UNIT E46. Rec covered interval.

BASE OF UNIT 94.15 TOP OF UNIT 95.65 THICKNESS 1.50

UNIT EL47. Weathering Character prom. Colour WS & FS-mottled dk and lt brownish-grey. Basal Contact covered. Bedding Character mottles are elongate subparallel to bedding. Bed Thickness very thick bedded, fractured. Composition dolomitic ls, xtal size <0.1 mm, 2 cm modal mottle size. Sedimentary Structures mottles approx 2 cm in size. Fossils solitary corals both upright and overturned, max size 2.5 cm, mode 1.0 cm. 0.5% colonial corals. *Catenipora*-small, generally only one chain, favositid corals to 10 cm across, 1-2% ossicles throughout the unit. Tr bryozoans and brachs, tr fairly large gastropods w/ shells to 1.5 mm thick, restricted to a zone 6 m abu, 0.5% stromatoporoids(?) 2 m abu, tr orthocones and small orthocone frags. Misc bitumenous odour, well indurated, fractured pale yellowish green (malachite?) stain on surface. A 2 m thick layer of 'concretions' may be altered stromatoporoids. EL47 Sample/Slab/Thin Section Description (rep litho sample taken 2 m abu), fresh surface colour; irregularly mottled wk m olive-brown (10YR 5/2) to wk dk olive-brown (10YR 4/2), sedimentary structures; irregular dolomitic mottles, composition; 46% fossils-30% articulated ostracods to 4 mm in size (mode 2 mm) have alternating dolospar and spar linings as well as outer coatings, 10% ostracod frags, 2% solitary corals, 1% bryozoans, tr high-spined (to 3 mm high) gastropods, 2% ossicles (one is 10 mm in diameter and has a 5-point star-shaped axial canal), tr *Catenipora*, one 5 mm long algal frag consists of single box-shaped 'cells' joined together, tr triaxon(?) sponge spicules, tr brach frags. 10% microspar, 5% spar especially between peloids, misc; tr spherulitic chalcedony, 34% f-m xyn dolomite concentrated in irregularly shaped mottles, most of the dolomite xtals are lath-shaped due to very extensive selective calcification and leaching of rhombs, 5% porosity along fractures. CL; very dull red luminescent dolomite, 2% bright orange luminescent calcite overgrowths, otherwise calcite is non-luminescent. FLUOR; spar cement is fluorescent. Rock Name: mottled dolomitic ostracodal biomicrosparite. E47a Sample/Slab Description (large solitary coral taken 3 m abu), fresh surface colour; vw dk olive-brown (10YR 4/1), sedimentary structures; irregularly-shaped dolomitic mottles, composition; 18% fossils, consist of 5% solitary corals (one w/ 29 mm diameter corallum), 5% ossicles and tr echinoderm stem (2 mm diameter), one ossicle has a 5-point star-shaped axial canal, one favositid coral frag (4%) to 15 mm in size, 4% ostracods to 2.5 mm in size, one 10 mm long tapering echinoderm arm(?). 32% microspar, 5% spar, 30% f xyn dolomite is concentrated in dolomitic mottles, 15% porosity between xtals/clasts. Rock Name: mottled dolomitic biomicrosparite. E47b Sample/Slab Description fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 10% fossils (dolomitic), 3% cup corals to 3.5 mm diameter, 5% ossicles, tr echinoderm stem frags, 1% tabular stromatoporoid to 25 mm in size, 1% ostracods to 2 mm in size, 30% microspar, 50% f-m xyn dolomite concentrated in irregular mottles and along stylolites, 10% porosity along stylolites. Rock Name: mottled fossiliferous microsparitic f-m xyn dolostone. Sample E47 taken for conodonts.

BASE OF UNIT 95.65 TOP OF UNIT 102.65 THICKNESS 7.00

UNIT EL48. Weathering Character prom. Colour WS & FS-m brownish grey. Basal Contact trans over 5 cm, planar. Bedding Character planar bedded. Bed/Lam Thickness-variable 2 to 10 mm, irregular pinching and swelling of lams. Composition ls w/ 0.3 mm xtal size. Fossils 3-4% poorly preserved brachs. Misc fractured, bitumenous odour.

BASE OF UNIT 102.65 TOP OF UNIT 103.15 THICKNESS 0.50

UNIT EL49. Weathering Character prom. Colour WS & FS-buff from a distance, mottled at

close range, subequally dk and lt brownish grey. Basal Contact planar trans over 5 cm. Bedding Character mottles are elongate parallel to bedding. Bed/Lam Thickness massive. Composition dolomitic ls, xtal size <0.1 mm, 2 cm modal mottle size. Sedimentary Structures mottles. Fossils 5% ostracods. E49 Sample/Slab Description (litho sample w/ ostracods taken from top of unit), fresh surface colour; mottled dk olive-brown (10YR 4/3) and wk lt olive-brown (10YR 6/2), 16% fossils, consisting of 15% ostracods to 17 mm wide and 1% conispiral gastropods to 13 mm high, tr ossicles, orthocone frags, and echinoderm spines. 30% microspar, 5% spar fills ostracods, 44% f xyn dolomite (50 μ m) is mainly concentrated in dolomitic mottles, 5% porosity. Rock Name: mottled/fossiliferous/microsparitic f xyn dolostone.

BASE OF UNIT 103.15 TOP OF UNIT 104.65 THICKNESS 0.50

UNIT EL50. Weathering Character prom. Colour WS and FS-m brownish grey. Basal Contact planar. Bedding Character planar. Bed/Lam Thickness variable 2 to 10 mm, irregular 'pinch and swell'. Composition ls w/ 0.3 mm xtal size. Fossils tr solitary corals to 4 cm long, one orthoconic nautiloid.

BASE OF UNIT 104.65 TOP OF UNIT 104.95 THICKNESS 0.30

UNIT EL51. Weathering Character prom. Colour WS and FS-buff from a distance, mottled up close, subequally dk and lt brownish grey. Basal Contact planar trans over 5 cm. Bedding Character mottles are elongate subparallel to bedding. Composition dolomitic ls (xtal size <0.1 mm), 2 cm modal mottle size. Fossils small bulbous stromatoporoid.

BASE OF UNIT 104.95 TOP OF UNIT 106.35 THICKNESS 1.40

UNIT EL52. Weathering Character prom. Colour WS and FS-m brownish grey. Basal Contact abrupt. Composition ls w/ 0.3 mm gn/xtal size. Sedimentary Structures planar bedding. Fossils poorly preserved brachs.

BASE OF UNIT 106.35 TOP OF UNIT 108.20 THICKNESS 1.85

UNIT EL53. Mottled as for EL47. Basal Contact abrupt planar. Fossils high-spined gastropods in upper 20 cm of unit, questionable presence of ostracods. Misc becomes more fissile at top, unit is structurally deformed. EL53 Sample/Slab/Thin Section Description (sample containing gastropods taken 4.7 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; wispy dolomitic mottles, low-amplitude stylolites, composition; 33% intraclasts to 4 mm in size are composed of peloids. 22% fossils, consist of 5% gastropods, 10% articulated ostracods, 5% ostracod frags, 1% solitary corals, tr ossicles, 1% echinoderm spines, 10% peloids (may be fecal pellets), 10% f xyn spar between peloids, 20% f xyn dolomite (50 μ m mode), extensive calcification of dolomite, 5% porosity along fractures and between xtals/gns, especially in dolomitic mottles. CL; non-luminescent except for 1% bright orange-luminescent clear spar veinlets filling fractures. Rock Name: fossiliferous dolomitic intrasparite.

BASE OF UNIT 108.20 TOP OF UNIT 113.10 THICKNESS 4.90

UNIT EL54. Weathering Character semi-prom. Colour WS and FS-m brownish grey. Basal Contact planar trans over 15 cm. Bedding Character lam to thinly bedded, lams turn up over lens of digitate stromatolites, fissile flaggy parting. Bed/Lam Thickness -min 3 mm, max 30 cm, mode 15 mm, interlam 3 mm thick dk and lt lams. Composition fissile ls (argil and/or carb). Sedimentary Structures laterally continuous parallel lams, small 'lens' of digitate stromatolites (20 cm wide and 10 cm thick) situated 1.5 m abu. Misc bitumenous odour. EL54 Sample/Slab/Thin Section Description (rep litho sample taken 2.0 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), low-amplitude stylolites, low-angle cross-lam, minor subvertical spar-filled fractures, composition; 54% peloids (composed of microspar), range in size from 25-100 μ m, mode is 50 μ m. 15% microspar, 10% spar occurs between peloids and fills veins, 1% bitumen along fractures, dolomite is close to stylolites or fractures, 15% f-m xyn dolomite, calcite pseudomorphs after dolomite are com, 5% porosity along stylolites, fractures, and between xtals. CL; 1% bright orange-luminescent composite spar after gypsum

xtal laths and bright orange-luminescent subvertical fracture-filling veinlets. Rock Name: dolomitic sparry pelmicrosparite. E54a Sample/Slab Description (stromatolites from a 'lens' 1.5 m abu), fresh surface colour: wk vdk olive-brown (10YR 3/2), sedimentary structures; convex-up lam (digitate stromatolites), digits to 18 mm wide and 35 mm high, are wider at the top than at the base, misc; minor fractures, 84% microspar contains approx 2% clay-sized brown insoluble mat'l, 5% vug-filling spar, 1% bitumen fills fractures and dolomitic lams, 5% f-m xyn dolomite is concentrated mainly along certain of the convex-up lams within the stromatolitic 'digits', 5% sample porosity along fractures and between xtal/gns. Rock Name: digitate stromatolitic sl dolomitic/ sl sparry microsparite.

BASE OF UNIT 113.10 TOP OF UNIT 115.25 THICKNESS 2.15

UNIT EL55. Weathering Character semi-prom, 10 m-sized outcrop. Colour WS & FS-m brownish grey. Basal Contact abrupt. Bedding Character mottled. Bed/Lam Thickness irregular bedding plane parting, min 1 cm, max 9 cm, mode 2 cm. Composition ls w/ 0.1 mm xtal size, 60% dk mottles, 40% lt mottles, 10% fossils. Sedimentary Structures mottles. Fossils 10% well-preserved but disarticulated convex-up brach valves throughout unit. Gastropods 0.4 m abu and tr ossicles. Misc bitumenous odour. Samples EL55-gastropods taken 0.40 m abu. E55a Sample/Slab Description (of brachs taken 25 cm abu), fresh surface colour: wk dk olive-brown (10YR 4/2), sedimentary structures; irregular dolomitic mottles, low-amplitude stylolites, misc; minor subvertical spar-filled fractures, composition; 22% fossils, consist of 20% brachs and brach frags, several species of moderately well-preserved brachs to 25 mm wide, some strophic, some non-strophic and costate, one high-spined gastropod (30 mm high), 1% ossicles, 40% microspar, 3% spar fills fractures, 30% f-m xyn dolomite is concentrated along stylolites and in mottles, 5% porosity along stylolites/fractures and between xtals/gns. Rock Name: mottled/dolomitic/brachiopodal biomicrosparite.

BASE OF UNIT 115.25 TOP OF UNIT 115.80 THICKNESS 0.55

UNIT EL56. Weathering Character semi-prom. Colour WS and FS-m brownish-grey. Basal Contact abrupt, planar irregular on a small scale. Bedding Character lam to thin-bedded, upper 40 cm contains intraclasts. Composition 80% intraclasts, 20% 'matrix' and porosity. Intraclasts are elongate and rd, modal clast size and shape is 0.5 cm thick and 8.0 cm long. EL56 Sample/Slab Description (taken 0.70 m abu), fresh surface colour: wk dk olive-brown (10YR 4/2), sedimentary structures; intraclasts, low-amplitude stylolites, misc; extensively fractured, composition; 70% rd intraclasts to 70 by 5 mm (composed of pelmicrospar), 1% fossils consist of tr gastropod frags, 1% brach frags, and one articulated ostracod 0.6 mm in size. 3% microspar, 10% spar between intraclasts (to c xyn), 1% bitumen between xtals/clasts and lining vugs, tr quartz replaces carbonate, 10% dolomite between intraclasts, dolomite w/ calcite inclusions is com (calcified dolomite?), 5% porosity in vugs between intraclasts and along fractures. CL; non-luminescent except for bright orange-luminescent zoned spar between intraclasts. Rock Name: dolomitic intrasparrudite.

BASE OF UNIT 115.80 TOP OF UNIT 116.80 THICKNESS 1.00

UNIT EL57. Weathering Character semi-prom. Colour WS and FS-m brownish grey. Basal Contact abrupt planar, irregular on a small scale. Bedding Character lt coloured wispy mottles. Composition ls, irregular, white dolomitic 'concretions' occur from 0.5 m abu to the top of the unit. Center of 'concretions' (which are probably altered dolomitic mottles) are chalky white, microxyn and poorly indurated w/ good porosity. Fossils tr favositid corals at top of concretionary zone. Misc bitumenous odour. EL57 Sample/Slab/Thin Section Description (rep litho sample w/ concretion and colonial coral), fresh surface colour: wk dk olive-brown (10YR 4/2), composition; 26% fossils consist of tr branching algae(?), 5% stromatoporoids, 20% favositid corals (to 60 mm in size), 1% *Catenipora* frags to 27 mm long, one phaceloid coral, tr triaxon(?) sponge spicules, tr ossicles, tr brach frags. 5% micrite, 34% microspar, 5% spar, 25% f-m xyn dolomite rhombs dispersed around fossil frags. Dolomite com has calcite inclusions. 5% interxyn porosity. CL; tr bright orange-luminescent subvertical fracture-filling veinlets. Dolomite luminesces a dull orange-red and calcite is non-luminescent. FLUOR; corallites are lined by fluorescent spar and filled by

non-fluorescent spar. Rock Name: dolomitic/sl sparry coralline biomicrosparite.
BASE OF UNIT 116.80 TOP OF UNIT 118.05 THICKNESS 1.25

UNIT EL58. Rec covered interval.

BASE OF UNIT 118.05 TOP OF UNIT 118.25 THICKNESS 0.20

UNIT EL59. Weathering Character semi-prom. Colour WS and FS-m brownish-grey. Basal Contact covered. Composition ls. Sedimentary Structures minor horizontally oriented mottles 1 cm wide at top of unit. Fossils tr gastropods 1.8 m abu. E59 Sample/Slab/Thin Section Description (gastropods 1.8 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; planar lam, low-amplitude stylolites, misc; numerous minor fractures, composition; 22% intraclasts to 2 mm in size, composed of pelmicospar, 3% m-spined gastropods to 5 mm in diameter, 38% peloids (40 μ m size mode and composed of microspar), 16% microspar between peloids, 5% spar, 1% interxyn bitumen. 10% f-m xyn dolomite is concentrated along stylolites and fractures, 5% porosity along stylolites, fractures and between xtals/gns. CL; non-luminescent except for bright orange-luminescent subvertical spar veinlets and tr blue-luminescent fluorite after dolomite. Rock Name: gastropod-bearing dolomitic/intraclastic pelmicosparite.

BASE OF UNIT 118.25 TOP OF UNIT 120.55 THICKNESS 2.30

UNIT EL60. Rec covered interval.

BASE OF UNIT 120.55 TOP OF UNIT 123.40 THICKNESS 2.85

UNIT EL61. Weathering Character prom, good 15 m wide exposure. Colour WS-wispy to mottled m brownish grey. FS-less yellowish. Basal Contact covered. Bedding Character wispy, irregularly bedded to mottled. Bed Parting Thickness bimodal, 20 and 2 cm. Composition microxyn ls. Fossils upper 20 cm of unit contains 25% leperditid ostracods, 1% gastropods and brachs and one orthoconic nautiloid. Misc bitumenous odour, limonitic stain accentuates bedding. Subvertical joint surfaces strike 145°, dip 87°E. Second joint surface strikes 55°, dips 84°SE. EL61 Sample/Slab/Thin Section Description fresh surface colour; mottled lt olive-brown (10YR 6/3) and wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 30% fossils, consist of 19% smooth articulated ostracods (to 16 mm wide) and 10% ostracod frags, ostracods have a two-layered valve in which calcite xtals are elongate at right angles to valve boundaries, 1% m-spined gastropods, tr plicated brachs, 1 smooth brach is 1 cm wide w/ pronounced fold and sulcus, tr echinoderm stems, 25% peloids com fill articulated ostracods and gastropods and occur between fossils. 5% micrite, 10% microspar, 10% spar partly fills ostracods (geopetal structure where spar overlies peloids in ostracods and gastropods); 15% f xyn dolomite rhombs dispersed between fossil frags, dolomite is also concentrated in irregularly-shaped mottles, calcite is com pseudomorphic after dolomite, 5% sample porosity distributed along stylolites and between xtals. CL; tr blue-luminescent fluorite after dolomite, valves are dull orange-luminescent and dolomite after acicular gypsum(?) xtals is bright orange-luminescent. There are also minor bright orange-luminescent subvertical dolomite veinlets. FLUOR; vugs and fossil casts of fluorescent spar. Rock Name: mottled dolomitic sparry ostracodal biopelmicosparite.

BASE OF UNIT 123.40 TOP OF UNIT 124.55 THICKNESS 1.15

UNIT EL62. Weathering Character semi-prom. Colour WS & FS m brownish grey. Basal Contact abrupt planar. Bedding Character lam to thin bedded. Composition ls. Sedimentary Structures laterally continuous parallel lams. Fossils tr ostracods.

BASE OF UNIT 124.55 TOP OF UNIT 125.00 THICKNESS 0.45

UNIT EL63. Weathering Character prom. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character massive. Bed Thickness 35 cm. Composition ls, a few intraclasts present, 0.1 mm xtal size. Sedimentary Structures vague lams, a few intraclasts. Misc bitumenous odour. EL63 Sample/Slab/Thin Section Description (rep litho sample taken at base of unit), fresh surface colour; vw dk olive-brown (10YR 4/1), misc; minor fractures,

composition; 49% microspar, 1% spar lines fractures, 5% bitumen between xtals and lining fractures, 40% f xyn dolomite contains microspar, 5% sample porosity along fractures and between xtals. CL; very dull red-luminescent calcite w/ the exception of tr bright orange-luminescent subvertical spar-filled veinlets. Bright orange-luminescent composite spar also occurs after tr gypsum xtals. There is also tr blue-luminescent fluorite after dolomite xtals. FLUOR; 2% uniformly scattered yellow fluorescent specks. Rock Name: sl bitumenous/dolomitic microsparite.

BASE OF UNIT 125.00 TOP OF UNIT 125.35 THICKNESS 0.35

UNIT EL64. Weathering Character semi-prom. Colour WS & FS-m brownish-grey. Basal Contact abrupt planar. Bedding Character lam to thin bedded. Bed/Lam Thickness 1 cm parting interlam w/ 1 mm thick partings. Sedimentary Structures wispy mottles. Composition ls.

BASE OF UNIT 125.35 TOP OF UNIT 126.85 THICKNESS 1.50

UNIT EL64a. Weathering Character semi-prom. Basal Contact trans planar over 5-10 cm. Bedding Character mottled, upper 20 cm trans into irregularly lam unit. Sedimentary Structures mottles. Composition ls.

BASE OF UNIT 126.85 TOP OF UNIT 127.75 THICKNESS 0.90

UNIT EL65. Weathering Character semi-prom. Colour WS & FS m brownish grey. Basal Contact planar, trans over 20 cm. Bedding Character lam to thin bedded. Bed/Lam Thickness min 3 mm, max 30 mm, mode 15 mm, interlam 3 mm thick dk and lt lams. Composition ls. Sedimentary Structures planar lams. Fossils none.

BASE OF UNIT 127.75 TOP OF UNIT 128.30 THICKNESS 0.55

UNIT EL66. Weathering Character prom. Basal Contact trans over 5 cm. Bedding Character wispy to mottled. Bed Parting Thickness bimodal at 20 and 2 cm. Composition microxyn ls. Fossils one orthoconic nautiloid 0.5 m abu.

BASE OF UNIT 128.30 TOP OF UNIT 129.80 THICKNESS 1.50

UNIT EL67. Rec covered interval.

BASE OF UNIT 129.80 TOP OF UNIT 130.55 THICKNESS 0.75

UNIT E68. Weathering Character semi-rec. Colour WS & FS-buff. Basal Contact covered. Bedding Character vague planar bedding. Composition ls, <0.1 mm xtal size. Sedimentary Structures vague planar bedding. Fossils none. Misc bitumenous odour. EL68 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, misc; minor fractures, composition; 45% peloids (composed of microspar), 30% spar, 10% xtal moulds of gypsum to 5 mm long, some w/ swallowtail terminations, 15% f xyn dolomite (size mode 50µm) concentrated near low-amplitude stylolites, calcite is com pseudomorphous after dolomite. CL; non-luminescent except for bright orange-luminescent spar after gypsum xtals. Rock Name: gypsum xtal mouldic dolomitic pelsparite.

BASE OF UNIT 130.55 TOP OF UNIT 131.15 THICKNESS 0.60

UNIT EL69. Rec covered interval.

BASE OF UNIT 131.15 TOP OF UNIT 133.15 THICKNESS 2.00

UNIT EL70. Weathering Character semi-rec. Colour WS & FS-buff. Basal Contact covered. Bedding Character vague planar bedding. Composition ls w/ <0.1 mm xtal size. Fossils none. Misc bitumenous odour. Sample EL70-conodont sample taken throughout unit.

BASE OF UNIT 133.15 TOP OF UNIT 137.25 THICKNESS 6.10

UNIT EL71. Weathering Character basal 0.50 to 1.0 m is prom, remainder semi-rec. Colour WS & FS-m brownish grey, black carb mat'l on bedding plane parting surfaces. Basal Contact

planar, trans over 5 cm. Bedding Character vague planar lams. Bed/Lam Thickness bed parting thickness mode 4.0 cm. Composition basal 0.5 to 1.0 m is calc dolostone that becomes more calc upward, <0.1 mm xtal size, locally crackle breccia. Sedimentary Structures planar lams, high-amplitude stylolites. Fossils tr ossicles. Misc bitumenous odour, fractured into small clasts, carb lams on fractures as well as bedding plane partings, <1% carb mat'l. EL71 Sample/Slab/Thin Section Description (litho sample taken at base of unit), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; stylolites w/ amplitudes to 2 mm are accentuated by 75µm thick residue. One stylolite is traceable laterally into calcified dolomite and further into an area where calcified dolomite has been dissolved to create very high interxyn porosity. There is also a high concentration of low-amplitude stylolites, composition; breccia w/ 60% clasts larger than 2 mm (max 30 mm), 10 mm modal size, clasts composed of microspar and minor micrite, only a few clasts are rotated, breccia may be classified as a crackle or stylo-breccia, some clasts are internally deformed, 'matrix' between clasts has a higher content of brown insoluble residue. Very fine xyn dolomite, one large dolomite xtal has been calcified. Sample porosity (3%) is distributed along fractures and stylolites. CL; non-luminescent. Rock Name: m calcirudite-sized breccia; microsparite 'clast' and 'matrix' crackle (stylo-) breccia.

BASE OF UNIT 137.25 TOP OF UNIT 141.75 THICKNESS 4.50

UNIT EL72. Weathering Character semi-rec. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character irregular, poor exposure, approx 3 m wide & 10 m or more high. Bed/Lam Thickness min 10 mm, max 30 mm, mode 20 mm. Composition fossiliferous carb calc dolostone w/ a 0.1-0.2 mm xtal size. Sedimentary Structures irregular lams. Fossils 10% well preserved gastropods, some high-spined, typically 8 mm wide near aperture, up to 30 mm long, tr ossicles. Misc bitumenous odour. EL72 Sample/Slab Description (litho sample w/ gastropods taken 0.5 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, dolomitic mottles, composition; 10% ostracods to 5 mm in size, 3% small gastropods. 52% microspar, 10% spar. 20% f xyn dolomite (50µm mode) is concentrated in dolomitic mottles. 5% interxyn sample porosity. Rock Name: mottled dolomitic/ostracodal biomicroparite. E72a Sample/Slab Description (high-spined gastropods taken 0.5 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), composition; 20% high-spined gastropods to 30 mm long, 2% articulated ostracods to 3 mm long. 50% peloids composed of microspar, 18% microspar between peloids, 5% spar fills some gastropods, 5% interxyn porosity. Rock Name: gastropodal pelmicroparite.

BASE OF UNIT 141.75 TOP OF UNIT 142.50 THICKNESS 0.75

UNIT EL73. Weathering Character semi-rec, semi-covered, similar to unit EL72 except that it weathers into flaggy scree. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character irregular. Bed/Lam Thickness min 10 mm, max 30 mm, mode 20 mm. Composition calc dolostone w/ 0.1-0.2 mm xtal size, flaggy weathering suggests an increased carb or argil content. Sedimentary Structures irregular lams. Fossils gastropods & ossicles as for previous unit. EL73 Sample/Slab Description (rep litho sample taken 3.0 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; planar to sl irregular lam w/ minor contorted lams, low-amplitude stylolites, composition; 80% microspar, 5% spar, 10% f xyn dolomite near stylolites, 5% interxyn sample porosity. Rock Name: dolomitic microparite.

BASE OF UNIT 142.50 TOP OF UNIT 146.00 THICKNESS 3.50

UNIT EL74. Weathering Character prom, major ledge-former, outcrop is over 100 m wide. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character vague planar to sl irregular. Bed/Lam Thickness vague, mode 1.0 m. Composition calc dolostone w/ carb flakes and <0.1 mm xtal size. Sedimentary Structures vague planar lams, high-amplitude stylolites result in a subvertical lineation. Misc weak bitumenous odour, fractures com. EL74 Sample/Slab/Thin Section Description (rep litho sample taken 1.0 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; high-amplitude (to 7 mm)

stylolites some of which terminate at spar-filled subvertical fractures, stylolites are accentuated by brown opaque residue to 25 μ m thick, misc; extensively fractured, many of the subvertical fractures terminate at stylolites, therefore fracturing is related to the dissolution of ls. There is also a slight apparent offset of stylolites across fractures and microfaults, composition; 1 articulated ostracod 0.13 mm in size, 5% micrite, 88% microspar, 2% f xyn spar, 5% microspar and f xyn spar pseudomorphous after gypsum xtals to 2 mm long, one of the pseudomorphed laths is offset by a stylolite. 1% vf-f xyn dolomite is dispersed and concentrated along stylolites, 5% sample porosity along stylolites and subvertical fractures. CL; non-luminescent except for dull orange-luminescence along fractures. Rock Name: sl sparry/sl micritic microsparite.

BASE OF UNIT 146.00 TOP OF UNIT 150.25 THICKNESS 4.25

UNIT EL75. Weathering Character prom major ledge-former. Colour WS & FS-buff. Basal Contact planar, trans over 20 cm. Bedding Character inversely-graded crackle to rubble breccia. Composition crackle breccia at base grades to rubble breccia 6 m abu, 80% 'clasts', 0-10% 'matrix', 10-20% porosity, 1-2% bitumen between ls clasts of various sizes. Basal 0.5 m has a 1-2 cm clast size mode. An unbrecciated zone occurs from 0.5 to 2.0 m abu and is overlain by breccia (clast size max 1.0 m, min 1 cm, mode 20 cm). Sedimentary Structures high-amplitude stylolites, hummocky structures to 1 m in size at base of breccia, convex-up structures (70 cm wide, 20 cm high) in breccia 2 m abu. Fossils ossicles and solitary coral (recrystallized?) 6.75 m abu. Misc bituminous odour, 'boudinage' on other side of valley. E75 Sample/Slab/Thin Section Description fresh surface colour; wk dk olive-brown (10YR 4/2) and wk vlt yellowish orange (10YR 7/2), sedimentary structures; dolomitic mottles, low-amplitude stylolites, composition; 50% fossils consist of 5% stick bryozoan frags, 5% ostracods to 1.1 mm, 3% ostracod frags, 5% stromatoporoid frags, 30% ossicles w/ spar overgrowths, 5% brachs (partly filled w/ peloids), 10% peloids between allochems are composed of microspar. 20% spar. 10% f-m xyn dolomite mainly between fossil frags w/ minor replacement of fossils, excellent examples of calcified dolomite. 20% sample porosity along stylolites and fractures, interxyn porosity is high near stylolites, also-high porosity was produced in dolomite rhombs that were calcified followed by leaching. The highest proportion of leached dolomite occurs near stylolites and fractures and is undoubtedly responsible for the crackle brecciation of this unit. CL; fossil frags are non-luminescent but the semi-opaque 'matrix' between them luminesces bright orange. FLUOR; 20% fluorescent isopachous spar cement (scalenohedra at right angles to pore walls). Rock Name: mottled dolomitic biosparite. EL75a Sample/Slab/Thin Section Description (ossicles and solitary corals taken from a large clast 6.75 m abu), fresh surface colour; mottled wk dk olive-brown (10YR 4/2) and wk vlt yellowish-orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, composition; 74% fossils, consist of 50% ossicles to 8 mm in size, some w/ 5 point star-shaped axial canals, 10% undifferentiated shell frags, 2% 20 mm wide favositid coral frag, 10% stick bryozoa (branching forms 2 mm wide and several cm long), 2% articulated brachs to 8 mm long. 6% microspar, 10% spar. 5% dolomite replaces coral walls and is dispersed in the form of f-m xyn rhombs. 5% sample porosity along stylolites. Rock Name: sl dolomitic/sl microsparitic ossicle-rich biosparite.

BASE OF UNIT 150.25 TOP OF UNIT 159.20 THICKNESS 8.95

UNIT EL76. Rec covered interval.

BASE OF UNIT 159.20 TOP OF UNIT 163.65 THICKNESS 4.45

UNIT EL77. Weathering Character prom. Colour WS & FS-buff. Basal Contact covered. Bedding Character breccia. Composition breccia, 60% 'clasts', 30% 'matrix', 10% porosity, buff & more com m brownish grey dolomitic ls clasts. Buff 'matrix' is ls to dolomitic ls and contains most of the bitumen. Clast size min 2 mm, max 30 cm, mode 4-5 cm. Fossils ossicles are a minor proportion of the clasts (one 30 cm-sized clast contains 3% ossicles). Sedimentary Structures high-amplitude stylolites. EL77 Sample/Slab/Thin Section Description fresh surface colour; wk m olive-brown (10YR 5/2) clasts in a lt olive-brown (10YR 6/3) 'matrix', composition; 12% fossils, consist of tr favositid coral and chain coral frags, 4% ossicles, one

18 mm long echinoderm stem, ossicles to 2.5 mm in size, 3% stromatoporoids, 5% ostracods, tr *Catenipora*, tr brach frags, tr chert, 3% dolomite, 10% porosity, 62% microspar 'clasts' (larger than 2 mm), 'matrix' between 'clasts' is 5% microspar and 25% spar. CL; the 'matrix', comprising 60% of the sample, is bright orange-luminescent, zonation in pore-lining spar is quite com. FLUOR; 10% fluorescent spar cement. Rock Name: sparry biomicrosparite crackle breccia.

BASE OF UNIT 163.65 TOP OF UNIT 181.15 THICKNESS 17.50

UNIT EL78. Weathering Character prom 17 m wide outcrop. Colour WS-buff limonitic(?) irregular patches, white 2 mm-sized spar. FS-m brownish grey. Basal Contact planar trans over 15-20 cm. Bedding Character planar irregular. Bed/Lam Thickness min 0.8 cm, max 30 cm, mode 4 cm (same as bedding plane parting), laterally continuous over 1 m. At 1.5 m abu it becomes thinner (1-2 cm). Composition ls w/ 0.1 to 0.4 mm xtal size, 10% fracture porosity and good fracture permeability. Sedimentary Structures high-amplitude stylolites define a subvertical lineation. Fossils poorly preserved high-spined gastropods and shell frags. Misc weak bitumenous odour, highly fractured. EL78 Sample/Slab/Thin Section Description (rep litho sample containing gastropods taken near base of unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 5% intraclasts, 10% peloid-filled ostracods and 10% peloid-filled high-spined gastropods to 7 mm high, 50% peloids composed of microspar and micrite, 5% microspar between allochems, 10% spar between peloids and filling ostracods, 2% insoluble brown residue, 3% dolomite, 5% sample porosity along stylolites, fractures and between xtals/gns. FLUOR; 3% fluorescent spar cement. Rock Name: sl dolomitic/microsparitic biopelmicrosparite. Sample E78 taken for conodonts.

BASE OF UNIT 181.15 TOP OF UNIT 184.15 THICKNESS 3.00

UNIT EL79. Rec covered interval.

BASE OF UNIT 184.15 TOP OF UNIT 186.10 THICKNESS 1.95

UNIT EL80. Weathering Character prom 2 m wide outcrop. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character planar irregular. Bed/Lam Thickness min 0.8 cm, max 30 cm, mode 4 cm, laterally continuous over 1 m. Composition ls, xtal size variable from 0.1-0.4 mm, 10% fracture porosity. Sedimentary Structures high-amplitude stylolites. Misc upper 30 cm fractured, basal portions flaggy like upper part of unit EL78.

BASE OF UNIT 186.10 TOP OF UNIT 187.10 THICKNESS 1.00

UNIT EL81. Weathering Character semi-rec. Colour WS-m brownish grey, buff from a distance. FS-m brownish-grey. Basal Contact covered. Bedding Character crackle breccia. Composition ls crackle breccia, 75% ls 'clasts', 15% ls 'matrix', 10% porosity. Clast size max 15 cm, min 0.2-0.4 cm, mode 10 cm. Sedimentary Structures high-amplitude stylolites. Fossils poorly preserved high-spined gastropods to 2 cm high weather out in relief. Misc sl bitumenous odour. EL81 Sample/Slab/Thin Section Description (unoriented rep litho sample), fresh surface colour; wk dk olive-brown (10YR 4/2) clasts in an xlt yellowish orange (10YR 8/3) 'matrix', sedimentary structures; dolomitic mottles in clasts, vugs, composition; tr ostracods in clasts most of which contain peloids, 5% f xyn dolomite (50µm mode) is concentrated in dolomitic mottles. 5% porosity along stylolites and fractures, 70% breccia clasts are larger than 2 mm and consist of sl ostracodal pelmicrosparite, in part the clasts form a 'jigsaw fit'-many clasts and parts of clasts are bleached in an extremely lt yellowish orange 'matrix'. 'Clasts' have trans boundaries. 'Matrix' (30%) consists of microspar/f xyn spar (ghost outlines of bleached clasts occur in the 'matrix'). Misc: one vug is filled w/ porous microspar and some spar rhombs (originally calcified dolomite?) are replaced by composite microspar. CL; 60% bright orange-luminescent 'matrix' between mainly non-luminescent 'clasts'. Rock Name: sl dolomitic/ostracodal pelmicrosparite 'clast' microspar/f xyn spar 'matrix' crackle breccia.

BASE OF UNIT 187.10 TOP OF UNIT 187.75 THICKNESS 0.65

UNIT EL82. Rec covered interval.

BASE OF UNIT 187.75 TOP OF UNIT 189.40 THICKNESS 1.65

UNIT EL83. Weathering Character semi-rec 1.5 m wide outcrop. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character vague lams, laterally continuous over 0.5 m, 1 mm thick, lt & dk alternating lams. Bed/Lam Thickness 1 mm thick lams, 8 cm parting thickness. Composition dolostone, 0.1 mm xtal size. Sedimentary Structures well-developed stylolites, thinly lam(?), hummocky, deformed strata and local breccia in unit. Misc sl bitumenous. EL83 Sample/Slab/Thin Section Description. (rep litho sample taken near top of unit), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; planar lam, low-amplitude stylolites, composition; 69% peloids range from 30-200µm in size and have a 75µm mode, 15% microspar between peloids, 10% spar between peloids and along fractures, 2% brown opaque mat'l along stylolites and between/in xtals, some lams contain a high proportion of composite microspar after dolomite rhombs to 100 µm in size, originally 5% of sample. Total now is 1% evenly distributed dolomite, 3% sample porosity along fractures and between xtals. CL; some lams are accentuated by dull orange-luminescent spar. Rock Name: lam pelmicrosparite.

BASE OF UNIT 189.40 TOP OF UNIT 190.65 THICKNESS 1.25

UNIT EL84. Rec covered interval.

BASE OF UNIT 190.65 TOP OF UNIT 191.75 THICKNESS 1.10

UNIT EL85. Weathering Character semi-prom 15 m wide exposure. Colour WS & FS-buff. Basal Contact covered. Bedding Character hummocky. Bed/Lam Thickness 1 mm-thick lams, parting thickness irregular due to fracturing (possibly a 10 cm mode). Composition ls w/ a 0.1 mm xtal size. Sedimentary Structures well-developed, high-amplitude stylolites, hummocky structures, contorted stratification and local brecciation. Misc sl bitumenous. EL85 Sample/Slab/Thin Section Description (rep litho sample taken near top of unit), fresh surface colour; vlt yellowish orange (10YR 7/3), sedimentary structures; high-amplitude (to 3 mm) stylolites bifurcate and reunite laterally, composition; 53% peloids composed of microspar, 35% spar between peloids, 2% brown opaque residue, 5% dolomite in part calcified, 5% interxyn porosity. CL; bright orange-luminescent spar along subvertical fractures and as irregular patches concentrated along certain lams. FLUOR; 3% fluorescent calcite cement. Rock Name: sl dolomitic sparite.

BASE OF UNIT 191.75 TOP OF UNIT 193.50 THICKNESS 1.75

E85 ends within the lower member of the Cape Crauford Formation.

H. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION F, MEASURED IN 1983.

Locality: Cape Crauford.

Latitude: 73°45'25"N.

Longitude: 84°54'00"W.

Section F covers the middle part of the lower member of the Cape Crauford Formation. Section F at 149 m is taken as stratigraphically equivalent to section G at 150 m and section Ec at 133.5 m. Unit Fa1 is approx equivalent to EL45. Section F is a repeat section and notes are not as complete as for section E. Started measuring 918 m southeast of the Lancaster Sound/stream confluence.

UNIT Fa1. Weathering Character prom. Colour WS & FS-dk grey. Composition locally brecciated dolomitic ls to ls, breccia contains numerous solitary corals many of which are broken. 'Clasts' are randomly oriented, 'matrix' contains colonial corals. Lam from 6.8 to 7.2 m abu, then back to mottled. Misc base of unit Fa1 is 93.2 m asl and is situated 723 m from

the coast.

BASE OF UNIT 93.20 TOP OF UNIT 101.80 THICKNESS 8.60

UNIT Fa2. Weathering Character prom. Colour dk gy. Bedding Character lam dk gy, contains a laterally continuous 1-2 cm thick brecciated unit. Composition calc dolostone, 1-2 cm thick brecciated unit, clast mode 3 mm, laterally continuous over 20-30 m.
BASE OF UNIT 101.80 TOP OF UNIT 103.80 THICKNESS 2.00

UNIT Fa3. Weathering Character semi-prom, Sedimentary Structures mottles. Composition ls w/ brachs & ossicles.

BASE OF UNIT 103.80 TOP OF UNIT 109.15 THICKNESS 5.35

UNIT Fa4. Weathering Character prom. Bedding Character dk grey lams. Composition dolomitic ls to ls. Sedimentary Structures planar lams.

BASE OF UNIT 109.15 TOP OF UNIT 111.25 THICKNESS 2.10

UNIT Fa5. Weathering Character prom. Colour WS-dk grey. Bedding Character interbedded dk grey mottled and dk grey lam beds. Bed/Lam Thickness dk grey lam units 0.25 m thick. Composition dolostone.

BASE OF UNIT 111.25 TOP OF UNIT 113.35 THICKNESS 2.10

UNIT Fa6. Weathering Character prom. Composition mottled dk gy ls to dolomitic ls.

BASE OF UNIT 113.35 TOP OF UNIT 114.00 THICKNESS 0.75

UNIT Fa7. Weathering Character prom. Composition dk gy lam ls.

BASE OF UNIT 114.00 TOP OF UNIT 116.75 THICKNESS 2.75

UNIT Fa8. Weathering Character prom. Description massive buff dolostone, 5-10 cm thick beds.

BASE OF UNIT 116.75 TOP OF UNIT 120.30 THICKNESS 3.55

UNIT Fa9. Prom dk gy lam ls.

BASE OF UNIT 120.30 TOP OF UNIT 122.75 THICKNESS 2.45

UNIT Fa10. Prom massive buff dolostone.

BASE OF UNIT 122.75 TOP OF UNIT 123.50 THICKNESS 0.75

UNIT Fa11. Prom lam dk grey ls.

BASE OF UNIT 123.50 TOP OF UNIT 124.90 THICKNESS 1.50

UNIT Fa12. Prom dk gy mottled ls.

BASE OF UNIT 124.90 TOP OF UNIT 127.00 THICKNESS 2.10

UNIT Fa13. Prom dk grey lam ls.

BASE OF UNIT 127.00 TOP OF UNIT 129.00 THICKNESS 2.00

UNIT Fa14. Prom buff massive dolostone.

BASE OF UNIT 129.00 TOP OF UNIT 131.30 THICKNESS 2.30

UNIT Fa15. Prom dk grey massive ls to dk grey dolomitic ls, bitumen on joint surfaces.

BASE OF UNIT 131.30 TOP OF UNIT 135.00 THICKNESS 3.70

UNIT Fa16. Rec massive buff dolostone.

BASE OF UNIT 135.00 TOP OF UNIT 135.40 THICKNESS 0.40

UNIT Fa17. Prom massive ls.

BASE OF UNIT 135.40 TOP OF UNIT 136.90 THICKNESS 1.50

UNIT Fa18. Prom massive buff dolostone.

BASE OF UNIT 136.90 TOP OF UNIT 137.50 THICKNESS 0.60

UNIT Fa19. Prom dk grey mottled dolomitic ls, grades up to buff dolostone. Mottled dolomitic ls contains ossicles.

BASE OF UNIT 137.50 TOP OF UNIT 141.85 THICKNESS 4.35

UNIT Fa20. Prom dk grey lam dolomitic ls, highly fractured to locally brecciated although the upper 3 m is massive.

BASE OF UNIT 141.85 TOP OF UNIT 150.00 THICKNESS 8.15

UNIT Fa21. Prom lam buff dolostone breccia. BASE OF UNIT 150.00 TOP OF UNIT 153.00 THICKNESS 3.00

I. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION G, MEASURED IN 1983.

Locality: Cape Crauford.

Latitude: 73°46'00"N.

Longitude: 84°56'W.

The base of section G begins in the lower member of the Cape Crauford Fm.

Section G at 150 m is taken as correlative w/ section F at 149 m and section E at 133.5 m.

Section G is situated approx 900 m north of the stream (by the base camp).

UNIT Ga1. Weathering Character major prom ledge-former. Basal Contact covered. Bedding Character vaguely defined hummocky structures. Composition breccia, dolomitic ls.

BASE OF UNIT 153.00 TOP OF UNIT 156.80 THICKNESS 3.80

UNIT Ga2. Weathering Character prom. Composition dk brown massive calc dolostone.

Sedimentary Structures high-amplitude stylolites throughout.

BASE OF UNIT 156.80 TOP OF UNIT 159.40 THICKNESS 2.60

UNIT Ga3. Rec covered interval.

BASE OF UNIT 159.40 TOP OF UNIT 162.00 THICKNESS 2.60

UNIT Ga4. Weathering Character prom. Colour WS-buff w/ malachite staining. Bedding Character lam w/ hummocky structures. Composition calc dolostone, locally brecciated.

Fossils corals and stromatoporoids.

BASE OF UNIT 162.00 TOP OF UNIT 164.00 THICKNESS 2.00

UNIT Ga5. Weathering Character prom. Colour WS & FS-buff. Composition calc dolostone.

Fossils crinoid stems to 5 cm long & 5 to 7 mm wide, also rare crowns. Ga5 Sample/Slab

Description (taken of crinoid stems and a crown), fresh surface colour; vlt yellowish orange (10YR 7/3), composition; 8% favositid corals to 5 cm in size, disparid(?) crinoid stems to 50 mm long and 15 mm wide, some crowns w/ arms, 45% ossicles (w/ crenella and 5-point star-shaped axial canals), tr stick bryozoans, 2% tabular stromatoporoids, tr plicated brachs, 5% spar, 25% f-m xyn dolostone, 15% porosity along stylolites and between xtals/fossils. Rock Name: dolomitic (f-m xyn) crinoidal biosparite.

BASE OF UNIT 164.00 TOP OF UNIT 168.00 THICKNESS 4.00

UNIT Gb6. Weathering Character prom. Colour WS & FS buff, grading to dk gy. Bedding Character inversely-graded rubble breccia (basal 1 m to 1.5 m is buff and contains clasts w/ a

3 cm modal size). Composition rubble breccia, contains buff dolostone and dk grey randomly oriented ls clasts. Clasts to 1 m in size, mode approx 30 cm, from 2 to 7 m abu, modal clast size increases up through unit. At 1 m abu there are approx 30% grey and 60% buff clasts. Fossils ossicles in some clasts.

BASE OF UNIT 168.00 TOP OF UNIT 177.00 THICKNESS 9.00

UNIT Gb7. Weathering Character prom. Colour WS & FS-buff, malachite staining in scree mat'l. Bedding Character wavy unbrecciated lams are overlain by a chert-rich inversely-graded breccia which extends down to cross-cut lams where they are 'downfolded'. Composition inversely graded dolostone breccia w/ chert clasts, the clasts have a 1 cm mode in the basal 10 cm, above this interval clasts are 10 cm or more in size. Sedimentary Structures hummocky structures at base are overlain and are 'cross-cut' by breccia, structures 10 cm wide and 3 cm high, but have a wide range of dimensions.

BASE OF UNIT 177.00 TOP OF UNIT 178.40 THICKNESS 1.40

UNIT Gb8. Weathering Character prom. Colour WS & FS-dk grey. Bedding Character locally brecciated. Composition locally brecciated dk grey ls.

BASE OF UNIT ~~178.40~~ TOP OF UNIT 181.00 THICKNESS 2.60

UNIT Gc9. (moved 145 m south to a locality 790 m north of the stream just east of the base camp). Weathering Character prom. Colour WS & FS-buff. Basal Contact covered. Bedding Character inversely-graded breccia. Composition breccia w/ dominantly buff dolostone clasts.

BASE OF UNIT 181.00 TOP OF UNIT 183.00 THICKNESS 2.00

UNIT Gc10. Weathering Character prom. Colour dk gy breccia clasts more com than buff dolostone clasts. Basal Contact trans over 1 m. Composition breccia, dk grey ls clasts more com than buff dolostone clasts, modal size 0.4 to 0.7 m. Fossils ossicles in some grey ls breccia clasts.

BASE OF UNIT 183.00 TOP OF UNIT 188.50 THICKNESS 5.50

UNIT G11. Prom buff dolostone-rich breccia.

BASE OF UNIT 188.50 TOP OF UNIT 189.50 THICKNESS 1.00

UNIT Gc12. Prom dk grey ls-rich breccia.

BASE OF UNIT 189.50 TOP OF UNIT 190.50 THICKNESS 1.00

UNIT Gc13. Prom buff lam highly fractured calc dolostone to dolostone.

BASE OF UNIT 190.50 TOP OF UNIT 191.40 THICKNESS 0.90

UNIT Gc14. Prom lam dk gy inaccessible (ls?) unit.

BASE OF UNIT 191.40 TOP OF UNIT 192.40 THICKNESS 1.00

UNIT G15. Prom massive buff dolostone.

BASE OF UNIT 192.40 TOP OF UNIT 193.90 THICKNESS 1.50

UNIT G16. prom massive dk grey ls.

BASE OF UNIT 193.90 TOP OF UNIT 195.00 THICKNESS 1.10

UNIT G17. Prom massive buff dolostone, minor lt grey beds near top.

BASE OF UNIT 195.00 TOP OF UNIT 198.00 THICKNESS 3.00

UNIT G18. Prom buff calc dolostone, hummocky structures throughout.

BASE OF UNIT 198.00 TOP OF UNIT 201.50 THICKNESS 3.50

UNIT G19. Prom buff dolostone.

BASE OF UNIT 201.50 TOP OF UNIT 202.50 THICKNESS 1.00

UNIT G20. Weathering Character prom. Colour dk grey. Composition dolomitic ls to ls, mottled at base, intraclasts and shell frags increase in proportion up through unit.
BASE OF UNIT 202.50 TOP OF UNIT 204.20 THICKNESS 1.70

UNIT G21. Prom buff dolomitic unit w/ hummocky structures.
BASE OF UNIT 204.20 TOP OF UNIT 206.25 THICKNESS 2.05

UNIT G22. Rec covered interval, buff where visible.
BASE OF UNIT 206.25 TOP OF UNIT 208.20 THICKNESS 1.95

UNIT Gc23. Prom massive buff calc dolostone w/ coated gns. Gc23 Sample/Slab/Thin Section Description (rep litho sample taken 0.8 m abu), fresh surface colour; vlt yellowish orange (10YR 7/3), composition; 1% intraclasts to 12 mm, coated gns (some elongate to 0.2 by 3.6 mm in size and coated gn aggregates (multi-nucleated), many coated gns are interlam dolostone and micrite/microsparite, modal size 100 μ m, coated gns in silicified areas have high porosity, 5% microspar and 20% spar between coated gns and coated gn aggregates. 3% f xyn chert replaces coated gns, 40% f xyn dolomite mainly in coated gns (50 μ m xtal mode). Calcified dolomite is com, dolomite rhombs in coated gns are cloudy whereas dolomite in spar between coated gns is clear, 5% porosity in silicified areas. CL; bright orange-luminescent composite spar after gypsum xtals which penetrate the coated gns. The dolomite luminesces very dull red, and in general, calcite is non-luminescent. Rock Name: dolomitic/microsparitic coated gn sparite.

BASE OF UNIT 208.20 TOP OF UNIT 216.20 THICKNESS 8.00

UNIT Gc24. Prom buff coated gn dolostone, Gc24 Sample/Slab/Thin Section Description (rep litho sample taken at base of unit), fresh surface colour; coated gns are vw xlt yellowish orange (10YR 8/1) in a 10YR 5/2 'matrix', composition; 65% coated gns (mode 2.5 mm, range 0.2-5 mm, spheroidal to ellipsoidal, some to 5 mm long by 0.5 mm wide), many have concentric lamellae, some are asymmetrical, only a few are multi-nucleated, 5% f xyn spar, 2% bitumen, dolomite between coated gns is vf-f xyn, coated gns consist of aphanoxyn/vf xyn dolomite, sample porosity is 5% and is especially high between the concentric lamellae of the coated gns. CL; a uniform dull red luminescence. Rock Name: sl sparry/coated gn aphano to f xyn dolostone.

BASE OF UNIT 216.20 TOP OF UNIT 216.80 THICKNESS 0.60

UNIT Gc25. Prom buff dolostone. Sedimentary Structures convex-up structures 8 cm wide and 4 cm high, minor vugs.

BASE OF UNIT 216.80 TOP OF UNIT 218.20 THICKNESS 1.40

UNIT Gc26. Prom dk grey massive oolitic calc dolostone to dolostone, basal 0.5 m contains intraclasts and vugs.

BASE OF UNIT 218.20 TOP OF UNIT 222.50 THICKNESS 4.30

UNIT Gc27. Prom dk grey dolomitic ls.

BASE OF UNIT 222.50 TOP OF UNIT 223.00 THICKNESS 0.50

UNIT Gc28. Prom buff massive dolostone.

BASE OF UNIT 223.00 TOP OF UNIT 224.00 THICKNESS 1.00

UNIT Gc29. Weathering Character; semi-rec. Colour WS & FS buff to lt brown. Basal Contact covered. Composition rubble-breccia w/ 1 cm modal clast size. There is a high proportion of chert clasts. Sedimentary Structures convex-up structures (to 30 cm wide and 5 cm high) within breccia 4 m abu, abundant 1 cm-sized clast moulds.

BASE OF UNIT 224.00 TOP OF UNIT 226.00 THICKNESS 2.00

UNIT Gc30. Prom dk grey bedded ls w/ dk grey chert lenses to 20 cm long and 1 cm thick,

locally brecciated, high-amplitude stylolites. Gc30-conodont sample taken.
BASE OF UNIT 226.00 TOP OF UNIT 226.80 THICKNESS 0.80

UNIT Gc31. Prom buff lam ls w/ local breccia beds, contains lenses of chert and ls.
 High-amplitude stylolites are numerous and define a subvertical lineation.
BASE OF UNIT 226.80 TOP OF UNIT 228.70 THICKNESS 1.90

UNIT Gc32. Prom dk grey ls, lam to thin bedded, locally brecciated. Basal contact is planar but deformed.
BASE OF UNIT 228.70 TOP OF UNIT 230.10 THICKNESS 1.40

UNIT Gc33. Prom breccia, large buff dolostone 'clasts', small dk 'clasts' and calc 'matrix'.
BASE OF UNIT 230.10 TOP OF UNIT 232.80 THICKNESS 2.70

UNIT Gc34. Rec covered interval.
BASE OF UNIT 232.80 TOP OF UNIT 242.10 THICKNESS 9.30

UNIT Gd35. Weathering Character prom, cavernous weathering at base, buttress-shaped outcrops to 30 m wide. Colour WS & FS-dk brownish grey, dk grey at a distance. Basal Contact covered, convex-up structures near the base. Composition mosaic to rubble breccia, 70% 'clasts', 30% 'matrix' (contains clasts to 30 cm in size). Porosity is 5-10% due to dissolved clasts. Clasts are mostly ang, lam ls to dolomitic ls, randomly oriented at base, almost bedded at top. Max size 1 m, mode 4-5 cm. Misc minor fault w/ 15 cm apparent displacement, beds dip 2 to 3°E. Gd35 Sample/Slab/Thin Section Description (rep litho sample taken at base of unit, contains convex-up structures), fresh surface colour; overall wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites grade laterally into fractures. Some subvertical spar veinlets terminate at stylolites. Stylolites form the boundaries of some clasts, composition; 5% ostracods (0.5 mm mode) in clasts, 10% f-c xyn spar between clasts, 15% dolomite, 5% porosity along stylolites and fractures, 65% clasts, composed of dolomitic (f-m xyn) sl ostracodal pelmicrosparite (min 2 mm, max indet, mode 2 cm?). CL: bright orange-luminescent 'matrix' between 'clasts', including complex multi-fold zonation. Dolomite in clasts luminesces dull red. FLUOR; fluorescent-zoned scalenohedral spar isopachfous cement on peloids, fractures are lined w/ zoned spar. Rock Name: dolomitic sl ostracodal pelmicrosparite 'clast' spar 'matrix' mosaic to rubble breccia.
BASE OF UNIT 242.10 TOP OF UNIT 243.30 THICKNESS 1.20

The base of G36 is taken as the base of the upper member of the Cape Crauford Formation.

UNIT G36. Weathering Character prom ledge-former. Colour WS & FS-dk brownish grey, dk grey from a distance. Basal Contact irregular, trans over 20 cm. Bedding Character lam to massive, mottled from 3.7 m abu and up. Bed/Lam Thickness min 2 mm, max 4 mm, mode 3 mm, laterally continuous for several metres, lam part 1.5 m abu. Composition dolomitic ls w/ <1% carb film, xtal size 0.2 mm. Sedimentary Structures planar lams 0.75 m thick from 1.5 m to 3.3 m abu. Fossils ostracods(?) 3.0 m abu. Misc bitumenous odour, some bitumen in pore space above 3.7 m abu. Gd36 Sample/Slab/Thin Section Description (contains ostracods 3 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 30% articulated ostracods to 4.5 mm in size, filled w/ peloids, 5% ostracod frags. 15% micrite, 30% microspar, 5% m-c xyn spar veinlet and 5% spar between peloids and peloid aggregates, 5% f-m xyn dolomite is concentrated in articulated ostracods, 10% vf-f xyn dolomite near stylolites, dolomite com has microspar inclusions and in places is leached, calcified dolomite com, 5% sample porosity distributed along stylolites, high interxyn porosity near stylolites. CL: bright orange-luminescent spar fills hairline fractures. Wide fractures are lined w/ bright orange-luminescent spar and filled w/ non-luminescent spar. FLUOR; minor weak fluorescent-zoned clear vug-filling spar. Rock Name: dolomitic/micritic/sparry ostracodal biomicrosparite. G36a Sample/Slab Description. (from upper part of unit), sedimentary structures; 1 mm wide 'tubes' on bedding planes,

dolomitic mottles, low-amplitude stylolites, composition; tr ostracods, 50% microspar, 5% spar as subvertical veins, 35% f-m xyn dolomite is concentrated as dolomitic mottles and along stylolites, 10% porosity along stylolites and between xtals, especially in the dolomitic mottles. Rock Name: sl sparry/dolomitic microsparite.

BASE OF UNIT 243.30 TOP OF UNIT 252.80 THICKNESS 9.50

UNIT G37. Rec covered interval.

BASE OF UNIT 252.80 TOP OF UNIT 263.60 THICKNESS 10.80

UNIT Gd38. Weathering Character prom, buttress-shaped 30 m wide outcrop. Colour WS & FS-buff. Basal Contact covered. Bedding Character thick-bedded units form mosaic breccia, thin bedded units form rubble breccia. Mosaic breccia is also traceable laterally into rubble breccia. Bed/Lam Thickness mode 0.3 m. Composition breccia, 'clasts' are 79% dolostone, 1% dk grey chert 'clasts', 15% 'matrix' consists of extremely c xyn spar w/ xtals to 1 cm, 5% sample porosity. Clasts are randomly oriented at base and fractured in place 1.4 m abu. Clast size mode 17 cm in breccia pipe, clasts sbang, planar faces are formed by joint surfaces. Clasts are dolomitic 4.4 m abu. Sedimentary Structures some clasts are mottled, clast moulds com. Gd38 Sample Description (taken of breccia w/ 'matrix'), fresh surface colour; vlt orangy yellow (2.5Y 7/3). Breccia contains clasts and numerous clast moulds to 30 mm in size, extremely c xyn spar between clast moulds.

BASE OF UNIT 263.60 TOP OF UNIT 269.50 THICKNESS 5.90

UNIT Gd39. Weathering Character prom, outcrop is buttress-shaped and 30 m wide. Colour WS & FS-mottled, buff. Basal Contact indistinct, grades laterally to breccia. Bed/Lam Thickness parting mode 0.3 m. Composition dolostone, from 7.5 to 9.5 m abu the percentage of breccia in veins increases but the unit is still mottled. From 10-22.5 m abu there are small concretions (1-2 cm in size) that become less numerous above 15.5 m abu. At 11.7 m abu there is a horizon of black chert lenses traceable laterally for 10 m. From 10.5 to 12 m abu it is quite fossiliferous containing orthoconic nautiloids, colonial and solitary corals as well as ossicles. Mottles increase to 3 cm in size 14.5 m abu and the unit is still dolostone. Colonial corals present. At 21.5 m abu it is mottled and in part brecciated. Veins occur throughout unit-colonial coral found. From 28.5-30.5 m abu there is a bed of white-concretionary structures (each 3-4 cm across and w/ brown 'rinds') that are probably altered mottles. Sedimentary Structures mottles. Fossils 1 small solitary coral, 1 plicated brach 4.5 m abu. 2-3% ossicles, 4 orthoconic nautiloids to 3 cm in size 12 m abu. Gd39 Sample/Slab/Thin Section Description. (rep litho sample taken 2 m abu), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; ghost mottles and numerous low-amplitude stylolites, minor cross-cutting f-m xyn spar veinlets, composition; 10% dolomitic ostracod frags, 5% dolomitic ossicles, 5% spar fills fractures and occurs between xtals/gns, tr white chert, 65% f-m xyn dolomite, larger dolomite xtals have clear rims and inclusion-rich lt brown cores, 15% porosity along stylolites/fractures and between xtals/gns, high porosity and permeability on either side of cross-cutting f-m xyn spar vein. CL; patchy moderate orange-red luminescent dolomite. FLUOR; 20% fluorescent-zoned dolomite, especially dolomite filling vugs. Rock Name: sl sparry ostracodal f-m xyn dolostone. Gd39a Sample/Slab/Thin Section Description (taken 3.5 m abu, contains a solitary coral), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; 'ghost' mottles, low-amplitude stylolites, composition; 15% ossicles, minor stem frags, 15% favositid corals, 10% spar fills corallites and fractures, tr length-slow chalcedony spherules, 15% polyxyn quartz some of which is pseudomorphic after carbonate rhombs, 2% opaque minerals(?), 35% f-m xyn dolomite, limpid dolomite lines and spar fills some corallites, minor calcified dolomite, 18% porosity especially along stylolites and between xtals. CL; a peculiar (asymmetric multi-fold zoned, red luminescent) limpid dolomite lines vugs. Vug-filling spar and silicified corallites are non-luminescent. The dolomite luminesces dull orange-red. FLUOR; com zoned fluorescent dolomite. Rock Name: siliceous/fossiliferous/sparry f-m xyn dolostone. Gd39b Sample Description (taken 11.5 m abu) contains an orthoconic nautiloid). Gd39c Sample/Slab/Thin Section Description (rep litho sample taken 23 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2).

sedimentary structures; low-amplitude stylolites, composition; fossils have all been dolomitized, 20% ossicles to 5 mm in size, small proportion of echinoderm stems to 20 mm long, 8% spar veins cross-cut bedding, 47% f-m xyn dolomite, limpid dolomite lines fractures and vugs that are filled w/ m-c xyn spar, dolomite has been leached in areas not cemented by spar. There are no calcified dolomite nor microspar inclusions in the dolomite, 25% porosity along stylolites/ fractures and especially between xtals, leached porosity in dolomite rhombs and porosity between gns. CL; a peculiar (asymmetric, orange-red zoned luminescent) limpid dolomite lines vugs. Most spar filling vugs is non-luminescent although there are exceptions such as zonation that crosses the spar xtal boundaries. In general, dolomite luminesces a uniform dull orange-red. FLUOR; dolomite and fracture-filled spar is com zoned. Rock Name: sl sparry ossicle-rich f-m xyn dolostone. Gd39d Sample/Slab/Thin Section Description (rep litho sample taken 32.2 m abu), fresh surface colour; mottled wk m brownish olive (2.5Y 5/2) and wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; low-amplitude wispy stylolites are marked by yellowish orange residue, 1% vugs to 3 mm in size, ghost mottle texture, composition; ghosts of 10% articulated ostracods to 1.8 mm in size and 3% shell frags, ghost peloid texture inside ostracods, 2% spar fills fractures and 2% bitumen lines vugs and fills interxyn pore space, 79% dolomite xtals some of which have inclusion-rich cores and clear rims, lt mottles dolomite xtal size is 100 μ m, also a higher proportion of limpid dolomite in lt mottles, dk mottles consist of f xyn dolomite (30 μ m mode), unmottled areas contain f xyn dolomite, 3% porosity along stylolites, fractures and between xtals. CL; uniform dull red-luminescent dolomite, orange-luminescent vug-lining dolomite, FLUOR; com fluorescent-zoned dolomite. Rock Name: mottled ostracodal f-m xyn dolostone. BASE OF UNIT 269.50 TOP OF UNIT 301.90 THICKNESS 32.40

UNIT Gd40. Weathering Character prom buttress-shaped outcrop. Colour WS-buff, FS-m grey. Basal Contact planar trans over 10 cm. Bed/Lam Character planar irregular, grades laterally into breccia. Bed Parting Thickness min 0.5 cm, max 10 cm, mode 4 cm. Composition dolostone, locally brecciated. Sedimentary Structures mottles. Fossils tr radiating and branching arms of an echinoderm crown. At 2 m abu-vague planar lams and breccia veins occur throughout the unit. Gd40 Sample/Slab Description. (rep litho sample taken 1 m abu), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; low-amplitude stylolites are accentuated by yellowish orange residue, a few spar veins cross-cut bedding, composition; radiating and branching arms of a crinoid crown, arms are 5 mm in diameter, tr spar-filled fractures, 90% f xyn dolomite (30 μ m mode), 10% porosity along stylolites and between xtals, interxyn porosity is especially high in a zone around spar-filled fractures and near stylolites. Rock Name: f xyn dolostone. BASE OF UNIT 301.90 TOP OF UNIT 306.00 THICKNESS 4.10

UNIT Gd41. Prom mottled dolostone w/ breccia veins. Echinoderm stem 5.25 m abu is 2 cm long. BASE OF UNIT 306.00 TOP OF UNIT 312.80 THICKNESS 6.80

UNIT Gd42. Weathering Character a prom buttress-shaped outcrop. Colour WS & FS-m brownish grey. Basal Contact trans through breccia, basal portion brecciated-becomes bedded & not so brecciated up through unit. Bedding Character planar to sl irregular beds, locally brecciated. Bed Thickness parting mode 3 cm; fairly continuous laterally over 2-3 m. Composition dolostone w/ 10% fracture and vuggy porosity, locally brecciated. Sedimentary Structures planar lams. Gd42 Sample/Slab Description (rep litho sample taken at base of unit), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; vaguely defined bedding, minor fractures cross cut bedding, poorly indurated, very permeable, composition; 2% f-m xyn spar along stylolites, 83% f xyn dolomite (50 μ m mode), 15% porosity along fractures and stylolites, enhanced interxyn porosity near fractures and stylolites. Rock Name: f xyn dolostone. BASE OF UNIT 312.80 TOP OF UNIT 313.55 THICKNESS 0.75

UNIT Gd43. Weathering Character prom buttress. Colour WS-buff to white, 1 mm rusty

brown streaks are parallel to lam. FS-lt grey. Basal Contact abrupt planar. Bedding/Lam Character vague planar lam. Bed Parting Thickness min 4 cm, max 50 cm, mode 15 cm. Composition dolostone. Sedimentary Structures vague planar lam, laterally continuous over several metres. Misc well indurated. Gd43 Sample/Slab Description (rep litho sample taken 0.45 m abu), fresh surface colour; wk xlt orangy yellow (2.5Y 8/2), composition; 2% microspar/spar as 0.5 mm wide veins that cross-cut bedding, 93% f xyn dolomite, 5% porosity between xtals and along fractures, rust-coloured oxide (limonite?) concentrated along stylolites and as patches along bedding planes, porosity/permeability is accentuated in limonitic patchy areas, sedimentary structures; relict stylolites. Rock Name: f xyn dolostone. BASE OF UNIT 313.55 TOP OF UNIT 316.50 THICKNESS 2.65

UNIT Gd44. Rec covered interval.

BASE OF UNIT 316.50 TOP OF UNIT 318.00 THICKNESS 1.50

UNIT Gd45. Prom mottled dolostone as for Gd39 & Gd41. Concretionary horizon from 1.3 to 2.5 m abu. White 'concretions' approx 10 cm across w/ dk brown 'rinds', probably are altered mottles. Gd45 Sample/Slab Description (unoriented sample w/ 'concretions' taken), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), 10% vugs to 5 mm, low-amplitude stylolites are accentuated by yellowish orange residue, one chert nodule (70 x 15 mm), which is elongate parallel to bedding contains tr brown pseudomorphs after pyrite, composition; tr spar, 10% lt brown chert nodule w/ white center, 70% m xyn dolomite (100µm mode), 20% porosity is distributed as 10% vugs, 10% along fractures/stylolites and between xtals. Rock Name: vuggy m xyn dolostone.

BASE OF UNIT 318.00 TOP OF UNIT 321.50 THICKNESS 3.50

UNIT Gd46. Rec covered interval except for mottled dolostone 8.5 and 12.5 m abu.

BASE OF UNIT 321.50 TOP OF UNIT 339.00 THICKNESS 17.50

UNIT Gd47. Weathering Character prom. Description mottled unit as for Gd39 and Gd41, contains white 'concretions' (1 to 4 cm across) w/ dk brown rinds. Basal Contact covered. Gd47 Sample/Slab/Thin Section Description fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), composition; 2% ossicles composed of dolomite, 2% spar and 2% bitumen between dolomite xtals, 88% m xyn dolomite, anhedral intergrown xtals, dolomite xtals have inclusion-rich cores and clear rims, est 3% inclusions in dolomite, 10% porosity as vugs and along stylolites, fractures and between xtals. Interxyn porosity is especially high near stylolites and fractures. CL; uniform moderate orange-red luminescent dolomite. FLUOR; fluorescent-zoned pore-filling dolomite. Rock Name: m xyn dolostone.

BASE OF UNIT 339.00 TOP OF UNIT 340.20 THICKNESS 1.20

UNIT Gd48. Rec covered interval.

BASE OF UNIT 340.20 TOP OF UNIT 345.00 THICKNESS 4.80

J. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION H, MEASURED IN 1983.

Locality: Cape York.

Latitude: 73°49'30"N.

Longitude: 86°50'00"W.

The base of section H is in the lower member of the Cape Crauford Formation.

Distances are east of creek near basecamp. At 1,124 m there is an outcrop of breccia in coastal cliffs. At 1,355 m there is stratified breccia along the coast.

CYS Sample/Slab/Thin Section Description (pyrite mineralization in scree, sample taken near sealevel, 1,502 m east of base camp), fresh surface colour; wk vlt yellowish-orange (10YR 7/2), sedimentary structures; vugs to 8 mm filled w/ m-c xyn pyrite, low-amplitude stylolites,

composition; 10% ossicle ghosts (dolomitic), 5% favositid coral frags (dolomitic) to 1 cm in size, tr spar, 10% pyrite xtals, some have dissolved to leave moulds in length slow chalcidonic areas. There are also well-defined moulds in the chalcidony resembling anhydrite, 50% f xyn dolomite (50µm mode), 15% porosity as vugs and between xtals, 10% silica. CL; dull orange-red luminescent dolomite, chert is non-luminescent. Rock Name: pyritic/chalcidonic/cherty fossiliferous f xyn dolostone. Sc1 Scree Sample Description (taken between 1600 m to 2,267 m east of base camp just above sealevel), sedimentary structures; low-amplitude stylolites, some vugs filled w/ 2% accumulations of f-c xyn pyrite, composition; 68% f xyn dolomite, 2% pyrite in vugs, 10% vugs to 1 cm in size are lined w/ c xyn limpid dolomite. 20% interxyn porosity. Rock Name: sl pyritic/vuggy f xyn dolostone. The base of section H is 2,094 m east of the base camp. Milf Sample/Slab Description (taken of structures resembling digitate stromatolites from breccia clast just above sealevel, 4,286 m east of base camp), fresh surface colour; interlam wk vlt yellowish-orange (10YR 7/2) and wk lt olive-brown (10YR 6/2), sedimentary structures; club-shaped stromatolitic structures to 130 mm high by 55 mm wide, convex-up structures inside columns, low-amplitude brown wavy films define wavy lam, composition; 80% vf-f xyn dolomite, 20% interxyn porosity. Rock Name: vf-f xyn dolostone. At 3,125 m-east of base camp-good outcrop at sealevel which underlies unit H0. The base of unit H0 is sealevel.

UNIT H0. Weathering Character semi-prom. Colour WS & FS-buff. Basal Contact covered. Composition breccia, dolomitic, clasts w/ stromatolitic structures in unit, carb lams in clasts and digitate stromatolitic structures. BASE OF UNIT 0.00 TOP OF UNIT 4.00 THICKNESS 4.00

UNIT H1. Weathering Character prom 10 m-wide outcrop. Colour WS & FS-buff from a distance, coated gns/clasts are m brown. Basal Contact abrupt irregular, breccia occurs below but is only partially visible. Composition ls w/ 4-5% vugs to 1 cm in size, partial fracture porosity, insoluble residue concentrated along stylolite surfaces. Sedimentary Structures com high-amplitude stylolites throughout unit, large variously-shaped coated clasts comprise 80% of unit. Hal Sample/Slab/Thin Section Description (rep litho sample w/ coated clasts taken 0.75 m abu), fresh surface colour; variable m olive-brown (10YR 5/3) to wk vlt yellowish orange (10YR 7/2), sedimentary structures; extensive high-amplitude (to 10 mm) stylolites accentuated by 250µm thick black residue along stylolites, some of the coatings on the coated clasts have been dissolved (are bounded by high-amplitude stylolites), coatings have a radial structure defined by inclusion-rich and inclusion-poor radial xtal zones, composition; 40% microspar, 54% f-m xyn spar, 1% chert replaces carbonate rhombs along stylolites, 5% porosity along stylolites. CL; alternate lamellae of coated clasts consist of bright orange-luminescent spar, 3% blue-luminescent fluorite after dolomite is concentrated in residue along stylolites. FLUOR; 30% pore-filling dull fluorescent-zoned spar. Rock Name: microsparitic f-m xyn sparite coated clast breccia.

BASE OF UNIT 4.00 TOP OF UNIT 5.00 THICKNESS 1.00

UNIT Ha2. Weathering Character prom. Colour WS-buff, FS-m brown. Basal Contact abrupt wavy. Bedding Character lam to thin-bedded, individual lams traceable for several metres. Bed/Lam Thickness min 1 mm, max 6.0 cm, mode 1.5 cm. Composition unfossiliferous ls, gn/xtal size <0.1 mm, 2% carb lams to 0.25 mm thick. Sedimentary Structures planar to wavy lam/bedding, high-amplitude stylolites w/ com carb residue. Misc subvertical fractures.

BASE OF UNIT 5.00 TOP OF UNIT 5.50 THICKNESS 0.50

UNIT Ha3. Weathering Character prom unit is traceable laterally for over 900 metres, same as breccia 1,347 m east of base camp. Colour WS & FS-irregular m grey and buff. Basal Contact abrupt wavy. Composition breccia, 70% 'clasts', 20% 'matrix', 10% porosity. Breccia is chaotic, lacks large 1 m-sized clasts at base. Tr black chert. Clast size min 4.0 cm, max 1.5 m, mode 30 cm, both buff and m gy clasts. randomly oriented, sbang to ang. Clast composition-mostly m brownish-grey ls clasts and a few buff ls clasts at the base, buff

'matrix' at base, 1-2% carb mat'l surrounds clasts. One clast is brecciated. Sedimentary Structures high-amplitude stylolites. Misc breccia extends up to covered interval where it ends approx 28.5 m abu.

BASE OF UNIT 5.50 TOP OF UNIT 22.00 THICKNESS 16.50

UNIT H4. Rec covered interval.

BASE OF UNIT 22.00 TOP OF UNIT 47.65 THICKNESS 25.65

UNIT Hb5. Weathering Character semi-prom 10 m-wide outcrop. Colour WS & FS-buff. Basal Contact covered. Bedding Character vague planar lam. Composition ls w/ carb lam, black chert nodule w/ 0.1 mm xtal size. Bed Parting Thickness max 15 cm, min 5 cm. Sedimentary Structures vague lam, com high-amplitude stylolites. Misc 5 cm-sized black chert nodules. Hb5 Sample/Slab/Thin Section Description (rep litho sample taken at top of unit contains high-amplitude stylolites), fresh surface colour; vlt yellowish orange (10YR 7/3), sedimentary structures; small-scale low-amplitude tangential cross-strata w/ sets to 5 mm thick, stylolites w/ amplitudes to 2.5 mm, composition; 2% composite microspar/f xyn spar after gypsum xtal laths to 125µm long, gn size mode is 10-20µm, 1% dolomite after microspar/spar, 5% porosity along lams/fractures and between xtals/gns. CL; non-luminescent except for 2% bright orange-luminescent overgrowths on composite spar after gypsum xtals. Rock Name: cross-lam f-gn calcilutite. Sample Hb5a taken for conodonts.

BASE OF UNIT 47.65 TOP OF UNIT 48.65 THICKNESS 1.00

UNIT H6. Rec covered interval w/ buff hummocky ls between 7.95 and 8.15 m abu.

BASE OF UNIT 48.65 TOP OF UNIT 61.35 THICKNESS 12.70

UNIT Hc7. Weathering Character semi-prom 3 m-wide outcrop. Colour WS & FS-buff. Basal Contact covered. Bedding Character vague planar lam/bedding. Bed Parting Thickness mode 4.0 cm. Composition ls w/ 0.2 mm xtal size. Sedimentary Structures vague planar lam/bedding.

BASE OF UNIT 61.35 TOP OF UNIT 61.70 THICKNESS 0.35

UNIT Hc8. Weathering Character prom 5 m-wide outcrop. Colour WS & FS-buff. Basal Contact abrupt wavy to hummocky. Bedding Character hummocky and convex-up. Bed/Lam Thickness lam. Composition unfossiliferous ls (0.1 mm xtal size) w/ black chert nodules to 3 cm wide. Sedimentary Structures hummocky lam (70 cm wide and 10 cm high) w/ smaller superimposed 5 cm wide and 1 to 2 cm high convex-up and wavy structures, minor local breccia. Misc well indurated. Hc8 Sample/Slab/Thin Section Description (rep litho sample taken 1.45 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; convex-up lam, minor crackle breccia, minor low-amplitude stylolites, composition; 93% vf-f xyn spar, tr chert, 3% f-c xyn spar veins, 1% vf xyn dolomite, 3% porosity along and near stylolites and between xtals, misc; tr white chert nodules to 1 mm in size, coated gns/clasts formed in inter-hummock depressions. CL; non-luminescent except for spar-filled subvertical fractures which luminesce a bright orange. One wide spar-filled veinlet, however is non-luminescent except at the middle of the veinlet. Rock Name: hummocky lam f xyn sparite.

BASE OF UNIT 61.70 TOP OF UNIT 63.55 THICKNESS 1.85

UNIT Hc9. Rec covered interval.

BASE OF UNIT 63.55 TOP OF UNIT 65.05 THICKNESS 1.50

UNIT Hc10. Weathering Character semi-prom 8 m-wide outcrop. Colour WS & FS-buff. Basal Contact covered. Composition ls w/ brown carb lams, large hummocky structure is several metres wide and has a 20 cm amplitude, overlies smaller hummocky structures. Misc minor fracture porosity.

BASE OF UNIT 65.05 TOP OF UNIT 66.45 THICKNESS 1.40

UNIT Hc11. Weathering Character semi-prom but poorly exposed. Colour WS & FS-buff. Basal Contact abrupt, wavy. Composition vuggy ls breccia. Sedimentary Structures very abundant high-amplitude stylolites, vugs. Hc11 Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish orange (10YR 7/2) clasts in a vwk m olive-brown (10YR 5/1) 'matrix', sedimentary structures; very high amplitude (to 8 mm) stylolites, some clasts are rotated at right angles to bedding. Stylolites occur along the rotated clast boundaries, composition; 60% clasts to 3 cm in size are composed of microsparite, and have a clotted texture, 40% 'matrix' consists of f-m xyn sparite interspersed w/ microsparite, misc; numerous veins of spar cross-cut the sample, 5% f xyn dolomite is in part calcified, 15% vugs between clasts. CL; spar of 'matrix' between clasts is orange-luminescent. FLUOR; fluorescent-zoned spar is com between clasts. Rock Name: microspar 'clast' (f-m xyn spar/microspar 'matrix') crackle to mosaic breccia.
BASE OF UNIT 66.45 TOP OF UNIT 66.55 THICKNESS 0.10

UNIT Hc12. Rec covered interval.
BASE OF UNIT 66.55 TOP OF UNIT 68.95 THICKNESS 2.40

UNIT Hc13. Weathering Character semi-prom 4-5 m wide outcrop. Colour WS-buff, FS-m brown. Basal Contact covered. Bed/Lam Parting Thickness max 14 cm, min 4 cm, mode 8 cm. Composition ls w/ 0.1 mm xtal size mode. Sedimentary Structures vague bedding. Fossils leperditid ostracods to 3 cm in size, moderately to well preserved, locally abundant on some bedding plane surfaces. Brachs <1% are of 2 kinds; 1. smooth w/ prom sulcus 2. ones w/ plications. Brachs may be crushed or moderately to well preserved. Hc13 Sample/Slab Description (taken of brachs and ostracods throughout the unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 17% articulated leperditid ostracods to 30 mm in size, filled w/ sl dolomitic microspar, 3% plicated rhynchonellid brachs to 6 mm wide, 25% microspar, 5% spar, 45% f-m xyn evenly distributed dolomite rhombs, 5% interxyn porosity. Rock Name: dolomitic/sl sparry ostracodal biomicrosparite.
BASE OF UNIT 68.95 TOP OF UNIT 69.60 THICKNESS 0.65

UNIT Hc14. Weathering Character semi-prom. Colour WS & FS-buff. Basal Contact wavy. Bedding Character wavy. Composition ls w/ 0.4 mm xtal size, minor 3-4% vugs. Sedimentary Structures wavy structures w/ a 30 cm wavelength and a 3 to 4 cm amplitude.
BASE OF UNIT 69.60 TOP OF UNIT 69.90 THICKNESS 0.30

UNIT Hc15. Weathering Character semi-rec. Colour WS & FS-m brownish-grey. Basal Contact abrupt wavy. Composition ls w/ carb films. Hc15 Sample/Slab/Thin Section Description (rep litho sample taken 0.8 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 3% ostracod valve frags to 200µm thick, valve microstructure consists of calcite xtals at right angles to the valve boundaries. 10% micrite, 66% microspar, 15% spar in a clotted texture, 3% vf-f xyn dolomite mainly along stylolites, minor calcified dolomite, 3% interxyn porosity. CL; a patchy very dull orange-red luminescence. Rock Name: sl dolomitic/micritic ostracod-bearing pelmicrosparite.
BASE OF UNIT 69.90 TOP OF UNIT 72.15 THICKNESS 2.25

UNIT Hc16. Weathering Character semi-prom but half-covered 4 m-wide outcrop. Colour WS & FS-buff. Basal Contact abrupt wavy. Bedding Character hummocky structures w/ a mode of 0.5 m and a 5-10 cm amplitude. Composition calc dolostone. Hc16 Sample/Slab/Thin Section Description (rep litho sample taken at base of unit), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; coated gns, some of which have been partly dissolved and crushed (broken lams w/ dissolved centers), ghost texture of stylolites defined by opaques, low-amplitude stylolites occur within coated gns, composition; 70% elongate multi-nucleated coated gns to 1 cm long, coatings consist of micritic microspar, vf xyn pyrite xtals are concentrated in the outermost coatings of some of the coated gns, some centers are f xyn spar, 'matrix' consists mainly of clotted microspar, 1% vf xyn dolomite, 5%

porosity along stylolites/fractures, between coatings in coated gns, and between xtals/gns. CL; coated gns have alternating dull orange-red and non-luminescent lamellae, spar filling veinlets luminesces bright orange. Rock Name: sparry coated gn microsparite.
BASE OF UNIT 72.15 TOP OF UNIT 73.40 THICKNESS 1.25

UNIT Hc17. Rec covered interval.

BASE OF UNIT 73.40 TOP OF UNIT 73.85 THICKNESS 0.45

UNIT Hc18. Weathering Character semi-prom 20 m-wide outcrop. Colour WS-mottled m brownish grey. FS-m brown. Basal Contact covered. Composition ls. Sedimentary Structures mottled, high-amplitude stylolites. Misc well indurated mottled unit is traceable laterally into non-mottled lateral equivalent. Hc18 Sample/Slab/Thin Section Description (rep litho sample taken 0.70 m abu), fresh surface colour; mottled wk dk olive-brown (10YR 4/2) and wk lt olive-brown (10YR 6/2), sedimentary structures; abundant low-amplitude stylolites in dk mottles. Mottles are irregularly-shaped to several cm in size and are calc, not dolomitic. lt mottles contain less spar and fewer stylolites than the dk mottles, mottle boundaries are com high-amplitude stylolites, composition; 3% ostracod frags, only one specimen (7 mm in size) is articulated, 69% peloid aggregates, (composed of micritic microspar). 10% microspar, 15% spar, 1% vf-f xyn dolomite mainly along stylolites, 2% interxyn porosity. CL; non-luminescent. FLUOR; fluorescent scalenohedral isopachous spar cement coats peloids, spar filling inter-peloid space is non-fluorescent. Rock Name: mottled microsparitic pelsparite.

BASE OF UNIT 73.85 TOP OF UNIT 75.15 THICKNESS 1.30

UNIT Hc19. Weathering Character semi-prom 15 m-wide outcrop. Colour WS-buff, FS-m brown. Basal Contact abrupt, wavy. Bedding Character hummocky structures 1.0 m wide and 5-10 cm high. Bed/Lam Parting Thickness a well-defined 1 mm mode. Composition ls.
BASE OF UNIT 75.15 TOP OF UNIT 78.20 THICKNESS 3.05

UNIT H20. Rec covered interval.

BASE OF UNIT 78.20 TOP OF UNIT 90.05 THICKNESS 11.85

The base of unit H21 is taken as the contact between the upper and lower members of the Cape Crauford Formation.

UNIT Hd21. Weathering Character prom m brown ledge-former hundreds of metres wide. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character planar bedded/lam, laterally traceable for many metres and has a constant thickness. Bed/Lam Thickness min 5 mm, max 20 cm, mode 3.0 cm. Composition ls w/ a zone of bluish black chert nodules (to 20 cm long and 5 cm thick), traceable laterally for 100's of metres. This chert nodular zone was observed along the coast between 2,029 m and 2,876 m east of base camp and 2.65 m abu. Sedimentary Structures planar bedding. Hd21 Sample/Slab/Thin Section Description (rep litho sample taken 1.0 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; minor low-amplitude stylolites, composition; 1% ostracod frags, rare articulated ostracods. 63% peloids (75µm size mode) are composed of microspar, many peloids have been altered to superficial coated gns w/ a radial calcite xtal structure, 'matrix' consists of 10% microspar and 15% spar, 1% dolomite, 10% interxyn porosity especially along stylolites. CL; non-luminescent. Rock Name: coated gn microsparitic pelsparite.

BASE OF UNIT 90.05 TOP OF UNIT 98.90 THICKNESS 8.85

UNIT Hd22. Weathering Character semi-prom, outcrop is 3 m wide and partially scree-covered. Colour WS & FS-buff. Basal Contact covered. Bedding Character planar lam. Bed/Lam Parting Thickness min 1.0 cm, max 20 cm, mode 5 cm. Composition ls w/ a few chert nodules. Sedimentary Structures planar lam. Hd22 Sample/Slab/Thin Section Description. (rep litho sample taken 0.5 m abu), fresh surface colour; lt olive-brown (10YR

6/3), sedimentary structures; low-amplitude stylolites, minor deformation, composition; 80% peloids to 100 μ m (composed of microspar), 20% f xyn spar. CL; non-luminescent except for bright orange-luminescent overgrowths on spar after gypsum xtals (3%). Rock Name: interbedded pelsparite and microsparite.

BASE OF UNIT 98.90 TOP OF UNIT 101.00 THICKNESS 2.10

UNIT H23. Rec covered interval.

BASE OF UNIT 101.00 TOP OF UNIT 115.65 THICKNESS 14.65

UNIT He24. Weathering Character semi-rec 3 m-wide outcrop. Colour WS & FS-buff. Basal Contact covered. Bedding Character hummocky (1 m wide, 10 cm high). Bed/Lam Thickness min 1 mm, max 5 mm, mode 2-3 mm. Composition dolostone. Misc well indurated.

BASE OF UNIT 115.65 TOP OF UNIT 115.95 THICKNESS 0.30

UNIT He25. Weathering Character prom 15 m-wide outcrop. Colour WS & FS-buff w/ white-weathering mottles. Basal Contact wavy abrupt. Bedding Character mottles are elongate parallel to bedding. Bed/Lam Parting Thickness min 10 cm, max 50 cm, mode 20 cm. Composition dolostone w/ approx 1% carb lams, 10% vugs. Sedimentary Structures 2-3 cm-sized mottles. Fossils approx 3-4% poorly preserved ossicles, orthoconic nautiloid in scree. Some vugs are brach moulds. Misc well indurated white concretions w/ brown rinds weather out throughout unit. Mottle size decreases from 3 cm to 1 cm upward in unit. He25

Sample/Slab/Thin Section Description (rep litho sample taken 10 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; stylolites com, composition; 25% ossicles, 5% spar, 25% chert w/ 15% porosity, high concentration of low-amplitude stylolites are accentuated by residue, 55% f-m xyn dolomite, 15% interxyn porosity. CL; a uniform dull orange-red luminescence. Rock Name: ossicle-rich f-m xyn dolostone. He25a Sample/Slab/Thin Section Description (taken of concretion), fresh surface colour; wk vlt orangy yellow (2.5 Y 7/2), sedimentary structures; tr vugs to 3 mm in size, low-amplitude stylolites are accentuated by dk brown residue, chert 'concretions', 5% ossicles to 3.7 mm in size, 1% ostracods preserved in chert, 1% spar (to 1 mm) fills vugs, tr pyrite xtals to 1 mm in size, 78% f-m xyn dolomite, 12% interxyn porosity, 3% vugs. CL; a uniform dull red luminescence. Rock Name: chert nodule/ ossicle-bearing f-m xyn dolostone.

BASE OF UNIT 115.95 TOP OF UNIT 160.05 THICKNESS 44.10

UNIT He26. Weathering Character prom, outcrop traceable laterally for hundreds of metres. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character indistinct planar beds, thinly interbedded dk and lt. Bed/Lam Thickness dk beds min 0.2 cm, max 0.5 cm, pinch and swell over 5 cm, some are continuous. Lt beds are 1 cm thick and laterally continuous. Composition dolostone. Sedimentary Structures planar beds. Misc well indurated. He26 Sample/Slab/Thin Section Description (rep litho sample taken 2.0 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; tr low-amplitude stylolites, rd mottles to 1.5 mm in diameter, composition; 1% articulated, thin, smooth-shelled ostracods are filled w/ clear m xyn dolomite, tr spar, 94% f xyn dolomite, 5% porosity. CL; a uniform dull red luminescence. Rock Name: f xyn dolostone.

BASE OF UNIT 160.05 TOP OF UNIT 163.25 THICKNESS 3.20

UNIT He27. Mottled as for He25. He27 Sample/Slab/Thin Section Description (taken 1.0 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; vugs to 3 mm in size, pyrite accumulations along low-amplitude stylolites, composition; 80% f-m xyn dolomite, 3% m xyn spar concentrated along stylolites, minor calcified dolomite where spar partly replaces clear vug-lining dolospar, 2% pyrite xtal accumulations, moulds of gypsum xtal laths to 3 mm long in pyrite, clear m xyn dolospar lines vugs, ghost(?) texture of gypsum(?) laths, 15% porosity. CL; a uniform dull orange-red luminescence. FLUOR; fluorescent-zoned spar and dolomite line vugs. Rock Name: sl sparry/sl pyritic f-m xyn dolostone.

BASE OF UNIT 163.25 TOP OF UNIT 168.70 THICKNESS 5.45

UNIT He28. Lam unit as for He26 but contains vugs.

BASE OF UNIT 168.70 TOP OF UNIT 173.65 THICKNESS 4.95

UNIT H29. Weathering Character prom, outcrop traceable laterally for hundreds of metres in buttress-like outcrops. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character vague bedding defined by laterally discontinuous lt brown lams. Bed/Lam Parting Thickness max 45 cm, min 25 cm. Composition dolostone w/ 0.3-0.5 mm xtal size. Sedimentary Structures brach moulds. Fossils brach moulds (one w/ plications). Misc well indurated.

BASE OF UNIT 173.65 TOP OF UNIT 174.60 THICKNESS 0.95

UNIT He30. Weathering Character prom. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character hummocky structures at base grade up into vague planar lams 0.5 m abu. Composition dolostone. Sedimentary Structures vague planar bedding w/ hummocky structures at base (0.5 m wavelength, 10 cm amplitude). Misc well indurated.

BASE OF UNIT 174.60 TOP OF UNIT 176.25 THICKNESS 1.65

UNIT He31. Rec covered interval.

BASE OF UNIT 176.25 TOP OF UNIT 177.40 THICKNESS 1.15

UNIT He32. Weathering Character semi-prom, outcrop traceable laterally for hundreds of metres along the coast. Colour WS & FS-buff. Basal Contact covered. Bedding Character vague planar bedding. Bed Parting Thickness min 2.0 cm, max 20 cm, mode 5 cm. Composition dolostone (0.3 to 0.5 mm xtal size). Sedimentary Structures vague planar bedding. Misc well indurated. He32 Sample/Slab/Thin Section Description (rep litho sample taken 0.35 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; vague planar lam, composition; 2% spar, 83% vf-f xyn dolomite, 15% interxyn porosity. CL; a uniform dull orange-red luminescent dolomite. Rock Name: vf-f xyn dolostone.

BASE OF UNIT 177.40 TOP OF UNIT 178.30 THICKNESS 0.90

UNIT He33. Mottled unit as for He25 except without concretions-c xyn dolostone. Fossils a few very poorly preserved tabular stromatoporoids.

BASE OF UNIT 178.30 TOP OF UNIT 180.15 THICKNESS 1.85

UNIT He34. Weathering Character prom, outcrop traceable laterally for hundreds of metres. Colour WS & FS-buff. Basal Contact trans over 25 cm. Bedding Character vague planar. Bed/Lam Parting Thickness min 5 cm, max 30 cm, mode 15 cm, irregular parting planes. Composition dolostone w/ <1% carb wisps, 0.5 mm modal xtal size. There is a zone of white concretions 3 m abu (5-10 cm long, 1 to 2 cm wide) and a zone of brach moulds 5 m abu. Sedimentary Structures vague planar to massive beds. Misc well indurated. He34 Sample/Slab/Thin Section Description (rep litho sample 1.0 m abu contains well-preserved brachs), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; tr vugs of articulated brach moulds to 6 mm in size, composition; tr ostracods to 3 mm in size, 20% m xyn spar w/ minor clear dolomite inclusions, 58% m xyn inclusion-rich dolomite is com leached (dissolved calcified dolomite?), 20% interxyn porosity, 2% vugs. CL; a uniform moderate orange-red luminescence. FLUOR; fluorescent dolomite and minor fluorescent-zoned dolomite. Rock Name: sparry m xyn dolostone.

BASE OF UNIT 180.15 TOP OF UNIT 187.90 THICKNESS 7.75

UNIT He35. Rec covered interval.

BASE OF UNIT 187.90 TOP OF UNIT 191.85 THICKNESS 3.95

UNIT He36. Weathering Character semi-prom, unit may be traced hundreds of metres laterally along the coast. Colour WS & FS-buff. Basal Contact covered. Bedding Character mottled to vague wispy bedding. Bed/Lam Parting Thickness min 10 cm, max 30 cm, mode 20

cm. Composition dolostone w/ 0.5-1.0 mm xtal size, 5% brach moulds. Sedimentary Structures wispy to mottled bedding. Fossils 5% ossicles. Misc well indurated.
BASE OF UNIT 191.85 TOP OF UNIT 197.90 THICKNESS 6.05

UNIT He37. Weathering Character semi-rec 1 m-wide outcrop. Colour WS & FS-buff. Basal Contact abrupt wavy. Bedding Character hummocky (1 m wavelength, 5 cm amplitude). Composition dolostone containing a nodular bluish black chert bed 10 cm wide and 2 cm thick.
BASE OF UNIT 197.90 TOP OF UNIT 198.50 THICKNESS 0.60

UNIT He38. Semi-prom mottled dolostone aa.
BASE OF UNIT 198.50 TOP OF UNIT 199.25 THICKNESS 0.75

UNIT He39. Semi-prom dolostone aa w/ hummocky structures.
BASE OF UNIT 199.25 TOP OF UNIT 199.45 THICKNESS 0.20

UNIT He40. Very mottled dolostone aa.
BASE OF UNIT 199.45 TOP OF UNIT 200.15 THICKNESS 0.70

UNIT He41. Massive buff dolostone w/ bluish black chert nodules. He41 Sample/Slab/Thin Section Description (rep litho sample w/ chert nodule), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; low-amplitude stylolites, composition; 5% smooth thin-shelled ostracods to 1 mm in size are preserved in chert nodules, many are articulated, tr ossicles, 5% interxyn spar, tr spar veinlets, tr m xyn pyrite, the chert nodule has approx 15% porosity and contains brown translucent organic(?) matter, 5% lt grey chert, 65% m xyn dolomite and 20% interxyn porosity. CL; a uniform dull orange-red luminescent dolomite. FLUOR; fluorescent dolomite. Rock Name: chert nodular/ostracodal m xyn dolostone.
BASE OF UNIT 200.15 TOP OF UNIT 200.85 THICKNESS 0.70

UNIT He42. Weathering Character prom. Colour WS & FS-buff. Basal Contact planar trans over 10 cm. Bedding Character vague planar lam. Bed Parting Thickness 4 beds, 30, 17, 8, and 15 cm thick, faintly lam. Composition dolostone w/ <1% laterally discontinuous carb lams, xtal size mode 0.3 mm, 10% vugs (8 mm modal size) (some brach moulds), good intergranular porosity. Sedimentary Structures vague, sl irregular planar lams. Fossils brach moulds. Misc well indurated, subvertical slickensides, sl bitumenous odour. He42 Sample/Slab/Thin Section Description (rep litho sample taken 10 cm abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; low-amplitude laterally continuous stylolites define lam, composition; tr ostracods, 5% m-c xyn spar in the interxyn space between dolomite xtals, 72% m xyn dolomite xtals have clear rims and inclusion-rich cores. 20% interxyn porosity, 3% vugs to 5 mm in size. CL; peloids luminesce a dull orange-red, cement between peloids is non-luminescent. FLUOR; fluorescent spar. Rock Name: sl sparry m xyn dolostone.
BASE OF UNIT 200.85 TOP OF UNIT 201.35 THICKNESS 0.50

The top of H42 is taken as the contact between units A and B of the upper member of the Cape Crauford Formation.

UNIT He43. Weathering Character this prom unit is traceable laterally for hundreds of metres along the coast. Colour WS-buff, FS-m brownish grey w/ dk bluish black chert. Basal Contact abrupt planar. Bedding Character mosaic to rubble breccia, uniform 4 cm clast size throughout unit. Composition breccia, base is 45% chert, 44% ls w/ 1% carb films. Fracture porosity is 10%. Chert clasts (max 9 cm, min 1 cm, mode 5 cm), ang, randomly oriented. Uppermost part is partly lam. Buff ls clasts-min 10, max 40 cm, ang, randomly oriented, some in place. Sedimentary Structures planar to wavy lam clasts. Misc chert nodules near upper contact. He43 Sample/Slab Description (chert clast taken from middle of unit), fresh surface colour; lt-m grey (2.5Y 6/0 to 2.5Y 5/0), sedimentary structures; darker grey band

near nodule, no bedding visible, some chalcedony lines vugs, composition; chert w/ 5% porosity. Rock Name: chert clast from breccia. BASE OF UNIT 201.35 TOP OF UNIT 202.55 THICKNESS 1.20

UNIT He44. Weathering Character prom. Colour WS & FS-buff. Basal Contact planar, abrupt. Bedding Character planar lam. Bed/Lam Thickness min 1 cm, max 4 cm, mode 2 cm. Composition dolomitic ls to ls. Sedimentary Structures planar lam. BASE OF UNIT 202.55 TOP OF UNIT 202.75 THICKNESS 0.20

UNIT He45. Weathering Character prom outcrop aa. Colour WS & FS-m brownish grey. Basal Contact abrupt planar. Bedding Character planar bedded but fractured. Bed/Lam Parting Thickness min 2 cm, max 20 cm, mode 5 cm. Composition ls w/ bluish black chert nodules, 0.1 mm xtal size. Sedimentary Structures planar bedding, minor high-amplitude stylolites. Fossils tr colonial corals (2 cm wide), 1% stromatoporoids (1 cm thick, 5 cm wide), 1-2% ossicles. Misc some vague weathered-out columnar stylolites. He45 Sample/Slab/Thin Section Description (rep litho sample taken 0.5 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2), minor low-amplitude stylolites are 'deflected' above and below stick bryozoan frags, composition; one bryozoan frag (3%) is 8 x 4 cm in size, one plicated brach frag is 6 mm thick, 1% articulated ostracods are up to 1 mm in size, 1% ossicles with syntaxial calcite overgrowths. 60% peloids w/ a 150µm size mode (composed of 10% micrite and 50% microspar), 25% f-m xyn clear spar between peloids, 5% vf xyn spar is concentrated along stylolites, dolomite replaces calcite, 5% porosity. CL; tr scattered blue-luminescent fluorite after dolomite, otherwise, peloids are dull orange-luminescent. FLUOR; 2% fluorescent scalenohedral spar as an isopachous cement around peloids. Rock Name: pelsparite. Sample H45a taken for conodonts.

BASE OF UNIT 202.75 TOP OF UNIT 204.25 THICKNESS 1.50

UNIT H46. Rec covered interval.

BASE OF UNIT 204.25 TOP OF UNIT 208.05 THICKNESS 3.80

UNIT Hf47. Weathering Character semi-rec. Colour WS-m grey w/ brown mottles, FS-m grey. Basal Contact covered. Bedding Character planar irregular. Bed/Lam Parting Thickness min 4 cm, max 10 cm, mode 7 cm. Composition ls w/ 1% carb lams, xtal size 0.2 mm. Misc well indurated. Hf47 Sample/Slab/Thin Section Description (rep litho sample taken 0.8 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; numerous low-amplitude stylolites, composition; superficial coated gns w/ articulated ostracods as nuclei are com, 67% mainly articulated ostracods w/ a mode of 0.2 to 0.4 mm (up to 4 mm), some have superficial coatings of radially disposed calcite blades, radial growth is also com within articulated ostracods. A few examples occur where both superficial outer coatings as well as inwardly directed radial growth is present, est 10% micrite and 20% microspar fills many articulated ostracods, 25% f-m xyn clear spar occurs mainly between ostracods, 5% f-m xyn dolomite rhombs w/ edges replaced by calcite, 3% porosity between xtals/gns and along or near stylolites. CL; 5% scattered bright orange-luminescent overgrowths on spar, dolomite luminesces a very dull orange-red, 5% scattered blue-luminescent fluorite after dolomite. FLUOR; scalenohedral fluorescent spar rims peloids (isopachous cement), spar filling space between peloids is non-fluorescent. Rock Name: sl dolomitic ostracodal biosparite. BASE OF UNIT 208.05 TOP OF UNIT 210.40 THICKNESS 2.35

UNIT Hf48. Weathering Character semi-rec. Colour WS-buff, FS-lt brownish grey. Basal Contact half-covered. Bedding Character convex-up structures. Composition dolostone, xtal size 0.4 mm. Sedimentary Structures high concentration of low-amplitude stylolites, convex-up structures 5-6 cm wide and 5 mm high. Hf48 Sample/Slab/Thin Section Description (rep litho sample taken about 10 cm abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; convex-up structures (to 15 mm high), distance between structures is 5 cm, high concentration of low-amplitude stylolites, composition; 25% f-m xyn spar, 65% m xyn (100µm mode) dolomite com has clear rims and inclusion-rich

cores. Excellent examples of calcified dolomite where cores are replaced, 10% porosity between xtals and along/near stylolites, in places calcified dolomite has been dissolved. CL; 5% scattered bright orange-luminescent overgrowths on spar, dolomite luminesces a very dull orange-red. Rock Name: sparry f-m xyn dolostone.

BASE OF UNIT 210.40 TOP OF UNIT 211.00 THICKNESS 0.60

UNIT Hf49. Weathering Character semi-prom 2-3 m wide outcrop. Colour WS & FS-m brownish grey. Basal Contact abrupt planar. Bedding Character planar lam. Bed/Lam Thickness min 1 mm, max 1.5 cm. Composition dolostone (0.2 mm xtal size). Sedimentary Structures planar lam. Misc well indurated.

BASE OF UNIT 211.00 TOP OF UNIT 211.25 THICKNESS 0.25

UNIT Hf50. Weathering Character semi-prom. Colour WS-buff, FS-m brownish grey. Basal Contact planar to sl irregular. Bedding Character planar irregular. Bed/Lam Parting Thickness min 2 cm, max 10 cm, mode NA. Composition dolomitic ls, intraclasts w/ a 3 mm mode. Sedimentary Structures planar bedding. Fossils bioclastic. Hf50 Sample/Slab/Thin Section Description (rep litho sample taken at base), fresh surface colour; mottled wk vlt yellowish orange (10YR 7/2) (dolomitic ls) and wk m olive brown (10YR 5/2) (ls), sedimentary structures; low-amplitude stylolites and mottles, composition; 15% ostracods (4.5 mm modal size), 25% peloids (composed of microspar), 10% microspar between peloids, 5% f xyn spar, 40% m xyn dolomite (75µm modal xtal size), calcified dolomite com, 5% porosity along stylolites. CL; very dull orange-red luminescent dolomite, calcite is mainly non-luminescent. FLUOR; com. Rock Name: mottled dolomitic (m xyn) ostracodal biopelmicrosparite.

BASE OF UNIT 211.25 TOP OF UNIT 211.45 THICKNESS 0.20

UNIT Hf51. Weathering Character semi-prom. Colour WS & FS-m brownish grey. Basal Contact planar trans over 30 cm. Bedding Character mottled. Bed/Lam Parting Thickness min 4 cm, max 20 cm, mode 8 cm. Composition ls w/ 2 chert nodule horizons, one is 0.15 m abu, 2nd is 0.55 m abu. Black nodules weather white, mode 10 cm. Fossils 80% ostracods. Sedimentary Structures mottles, superficial coatings w/ ostracods as nuclei. Hf51 Sample/Slab/Thin Section Description (rep litho sample taken 1.0 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 43% articulated ostracods to 2 mm in size are nuclei of coated gns. 5% micrite, 10% microspar, 20% f xyn spar, tr chert, 20% m xyn dolomite (mode 100µm), 2% along fractures and stylolites. CL; very dull orange-red luminescent calcite. FLUOR; fluorescent-zoned dolomite is com. Rock Name: dolomitic/sl micritic ostracodal (w/ superficial coatings) biomicrosparite.

BASE OF UNIT 211.45 TOP OF UNIT 212.75 THICKNESS 1.30

UNIT Hf52. Weathering Character semi-prom. Colour WS-buff, FS-lt to m brownish grey. Basal Contact abrupt wavy. Bedding Character wavy structures are defined by carb films, good parting. Composition calc dolostone w/ 0.2 mm xtal size, 1-2% carb lams, small wavy structures 5 cm wide and 5 mm high.

BASE OF UNIT 212.75 TOP OF UNIT 213.75 THICKNESS 1.00

UNIT Hf53. Weathering Character semi-prom. Colour WS & FS-buff. Bedding Character wispy irregular carb lams. Composition calc dolostone w/ minor carb lams.

BASE OF UNIT 213.75 TOP OF UNIT 213.95 THICKNESS 0.20

UNIT Hf54. Weathering Character semi-prom, outcrop traceable for hundreds of metres along coast. Colour WS & FS-buff. Basal Contact abrupt, planar. Bedding Character planar. Bed Parting Thickness mode 10 cm. Composition dolostone w/ a 0.2 mm xtal size. Sedimentary Structures planar bedding. Misc well indurated.

BASE OF UNIT 213.95 TOP OF UNIT 214.60 THICKNESS 0.65

UNIT Hf55. Weathering Character semi-prom. Colour WS & FS-buff. Basal Contact trans

over 10 cm. Bedding Character convex-up structures on various scales (4 cm wide and 1 cm high to 20 cm wide and 3 cm high), locally crackle breccia. Bed/Lam Parting Thickness min 2 cm, max 10 cm, mode 3 cm. Composition dolomitic ls. Misc less carb film than for previous unit. Hf55 Sample/Slab/Thin Section Description (rep litho sample taken 0.2 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; lam, sl brecciated, convex-up structures(?), composition; 84% f-m xyn dolomite (100µm modal size), xtals have inclusion-rich cores and clear rims, the inclusion-rich cores of the dolomite xtals are com replaced by calcite, 15% spar between dolomite xtals, 1% porosity along fractures. CL; uniform dull orange-red luminescent dolomite, calcite is non-luminescent except locally as vug-filling. Rock Name: sparry m xyn dolostone crackle breccia.
BASE OF UNIT 214.60 TOP OF UNIT 214.95 THICKNESS 0.35

UNIT Hf56. Weathering Character semi-prom. Colour WS & FS-dk brwn. Basal Contact convex-up and wavy (20 cm wide and 3 cm high to 3 cm wide and 1 cm high). Bedding Character in part mottled. Composition dolomitic ls to ls. Sedimentary Structures in part bioturbated, 'worm(?) tubes' 2 mm in diameter, most are horizontal. Fossils orthoconic nautiloid (5 cm long by 1 cm across), stromatoporoids, 1% ossicles.
BASE OF UNIT 214.95 TOP OF UNIT 215.15 THICKNESS 0.20

UNIT Hf57. Weathering Character semi-prom 3-4 m sized outcrop. Colour WS & FS-buff. Basal Contact abrupt, irregular. Bedding Character vague planar lams. Bed Parting Thickness min 1 cm, max 4 cm, mode 2.5 cm. Composition calc dolostone, xtal size 0.30 mm, ls where fossiliferous. Sedimentary Structures vaguely planar lam. Fossils at base of unit there is a zone rich in *Atrypoides*-like brachs as well as plicated brachs. Misc fissile. H57 Sample/Slab Description (brachs taken at base of unit), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; planar irregular lam, composition; 3% articulated brachs to 10 mm in size cf. *Atrypoides*. Also included are plicated rhynchonellids up to 13 mm wide that have prom folds and sulcuses, 1% articulated ostracods to 2 mm in size, 1% ostracod frags, 25% microspar, tr spar fills ostracods, 70% f-m xyn dolomite. Rock Name: fossil-bearing microsparitic f-m xyn dolostone.
BASE OF UNIT 215.15 TOP OF UNIT 216.60 THICKNESS 1.45

UNIT Hf58. Weathering Character semi-rec, small (3-4 m wide) outcrop. Colour WS & FS-mottled buff & m brownish grey. Basal Contact abrupt planar. Bedding Character mottled. Bed Parting Thickness min 4 cm, max 5 cm, mode NA. Composition calc dolostone (0.1 mm xtal size). Sedimentary Structures low-angle cross-bed between stromatolites (stromatolites 30 cm wide and 10 cm high). Hf58 Sample/Slab/Thin Section Description fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 1% brachs, 3% ossicles, tr *Catenipora* frags, 63% stromatoporoids, the porosity of which is filled w/ spar except near edges where dolomite is com, 50% f-m xyn dolomite, microspar/f xyn spar com replaces boundaries and cores of dolomite rhombs, 25% porosity is distributed as 23% porosity where stromatoporoids have been leached (in some cases vugs range to 15 mm in size) and 2% porosity along stylolites. CL; very dull orange-red luminescent dolomite except for rare blue-luminescent fluorite after dolomite, calcite is non-luminescent. FLUOR; fluorescent scalenohedral dolomite lines pores. Rock Name: vuggy sparry (f xyn) stromatoporoidal f-m xyn dolostone.
BASE OF UNIT 216.60 TOP OF UNIT 216.95 THICKNESS 0.35

UNIT Hf59. Weathering Character semi-rec. Colour WS & FS-m brownish grey. Basal Contact abrupt planar. Bedding Character hummocky structures. Bed Parting Thickness min 3 cm, max 15 cm, but NA for hummocky part. Composition calc dolostone w/ a 0.1 mm xtal size. Sedimentary Structures low-angle cross-bed(?) between hummocky structures (30 cm wide and 10 cm high).
BASE OF UNIT 216.95 TOP OF UNIT 217.35 THICKNESS 0.40

UNIT Hf60. Weathering Character semi-rec 3-4 m wide outcrop. Colour WS & FS-lt buff.

Basal Contact abrupt planar. Bedding Character vague planar bedding. Composition dolostone w/ chert nodules, xtal size <0.1 mm. Sedimentary Structures high-amplitude stylolites in basal 1 cm of unit. Hf60 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites are accentuated by dk residue, composition; 3% spar, 82% f xyn dolomite (30 μ m modal size), xtals have inclusion-rich cores and clear rims, 15% interxyn porosity. CL; a moderate orange-red luminescence. FLUOR; fluorescent scalenohedra (isopachous cement) lines pores and stromatoporoids. Rock Name: f xyn dolostone.
BASE OF UNIT 217.35 TOP OF UNIT 217.45 THICKNESS 0.10

UNIT Hf61. Weathering Character semi-prom 15 m-wide outcrop. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character wavy lams vary in thickness. Bed Parting Thickness lam thickness min 1 mm, max 6 mm, mode 3 mm. Composition dolostone w/ a 0.2 mm xtal size. Sedimentary Structures wavy dk and lt lams.
BASE OF UNIT 217.45 TOP OF UNIT 217.60 THICKNESS 0.15

UNIT Hf62. Weathering Character prom 15-20 m-wide outcrop. Colour WS & FS-mottled m brownish grey and dk brownish grey. Basal Contact abrupt planar. Bedding Character vaguely bedded. Bed Parting Thickness min 3 cm, max 20 cm, mode 7 cm. Composition fossiliferous ls w/ chert nodules, 5% vugs, some green malachite staining, <1% irregular carb beds. Sedimentary Structures vague bedding. Fossils 30% tabular stromatoporoids both in and out of place, mode 5 mm thick, 10 cm long, wavy. Plicated brachs. Hf62 Sample/Slab/Thin Section Description (rep litho sample w/ malachite(?) staining on surface), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; vugs to 1 cm in size in areas between stromatoporoids, composition; 30% stromatoporoids (in part dolomitized), most of the pore space is filled w/ f-m xyn spar, 5% plicated rhynchonellid brach frags, tr favositid coral frags, 10% spar in 'matrix' of dolomite between fossils, 5% chalcedony after calcite of stromatoporoid, tr pyrite, 20% f xyn dolomite (modal size 40 μ m) and 0.7 mm-sized xtals, calcified dolomite is very com as replaced cores of xtals and corroded rims, 10% patchy c-vc xyn dolomite to 1 cm, 5% vugs (dissolved stromatoporoids) to 1 cm, 15% interxyn porosity. CL; dull orange-red luminescent dolomite except for rare blue-luminescent fluorite after dolomite xtals, calcite is generally non-luminescent (except for minor vug-filling zoned calcite), chert luminesces a very dull green. Rock Name: stromatoporoidal (in part chalcedonic) sparry f xyn dolostone. Sample H62a taken of brachs.
BASE OF UNIT 217.60 TOP OF UNIT 218.85 THICKNESS 1.25

UNIT Hf63. Description as for Hf60 except that it is calc dolostone w/ considerable chert.
BASE OF UNIT 218.85 TOP OF UNIT 219.30 THICKNESS 0.45

UNIT Hf64. Weathering Character prom. Colour WS & FS-base lt brownish grey, top buff. Basal Contact abrupt planar. Bedding Character convex-up structures. Bed Parting Thickness min 1 cm, max 5 cm, mode 3 cm. Composition calc dolostone. Sedimentary Structures convex-up structures to 60 cm wide and 15 cm high throughout unit, weather out by stream.
BASE OF UNIT 219.30 TOP OF UNIT 220.15 THICKNESS 0.85

UNIT Hf65. Weathering Character semi-prom. Colour WS & FS-buff. Basal Contacts abrupt planar. Bedding Character vague planar lams. Bed/Lam Thickness mode 3 mm, laterally continuous. Bed Parting Thickness mode 2 cm. Composition dolomitic ls w/ a 0.2 mm xtal size. Sedimentary Structures planar lam.
BASE OF UNIT 220.15 TOP OF UNIT 220.45 THICKNESS 0.30

UNIT Hf66. Weathering Character prom, forms ledge. Colour WS & FS-mottled m brownish grey and m grey. Basal Contact abrupt planar. Bedding Character vague, irregular. Bed Parting Thickness irregular parting planes, min 1 cm, max 7 cm, mode 4 cm. Composition fossiliferous ls w/ <1% irregular carb films, 0.2 mm xtal size. Sedimentary Structures irregular bedding, carb films are laterally discontinuous. Fossils 20% tabular stromatoporoids,

mostly in place, 10 cm long and 0.5 cm wide. Hf66 Sample/Slab/Thin Section Description (rep litho sample at top of unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 28% intraclasts composed of pelmicrite/ microspar, elongate rd intraclasts to 15 mm long, 25% brach frags, one articulated brach is 2 mm in size, tr favositid corals. 10% micrite, 7% microspar, 15% spar, 15% m xyn dolomite, calcite com replaces dolomite, 3% porosity along stylolites and fractures. CL; rare blue-luminescent fluorite after dolomite, dull orange-luminescent 'ghosts' of former dolomite(?) (now composite microspar), fossil frags are non-luminescent. FLUOR; minor white fluorescent scalenohedral calcite lines vugs. Rock Name: dolomitic/ micritic/ microsparitic brachiopodal intrasparite.

BASE OF UNIT 220.45 TOP OF UNIT 220.90 THICKNESS 0.45

UNIT Hf67. Weathering Character semi-prom. Colour WS & FS-m brownish grey. Basal Contact abrupt planar. Bedding Character planar lam, thin hummocky unit 1.15 m abu. Chert nodules com 1.3 m abu. Lams 'skirt' a chert nodule. Bed Parting Thickness min 10 cm, max 8 cm, mode 4 cm. Composition ls, black chert nodules-mode 7 cm long, 3 cm wide, thin brownish films on lams, 0.2 mm xtal size. Sedimentary Structures lams continuous laterally for several metres, hummocky structures 1.15 m abu are 5 cm wide and 2 cm high.

BASE OF UNIT 220.90 TOP OF UNIT 222.30 THICKNESS 1.40

UNIT Hf68. Rec covered interval.

BASE OF UNIT 222.30 TOP OF UNIT 223.15 THICKNESS 0.85

UNIT Hf69. Weathering Character semi-rec 1 m-wide outcrop. Colour WS-buff, FS-m brownish grey. Basal Contact covered. Bedding Character planar irregular. Bed Parting Thickness min 2 cm, max 5 cm, mode 3 cm. Composition dolomitic ls, wispy carb film forms parting. Sedimentary Structures planar irregular bedding, vugs, bioturbation (3 mm wide 'tubes'). Hf69 Sample/Slab/Thin Section Description (rep litho sample taken at the base), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; pervasive low-amplitude stylolites, composition; 15% brach frags, 25% spar, 10% m-c xyn spar fills irregular patches, 47% f xyn dolomite, vug-lining m xyn dolomite has clear rims and inclusion-rich cores, extensively calcified dolomite (replaced cores of dolomite rhombs), 3% porosity along stylolites. CL; dolomite is dull orange-luminescent except for 1% scattered blue-luminescent fluorite after dolomite, calcite is non-luminescent. FLUOR; dolomite is fluorescent, calcite is non-fluorescent. Rock Name: sparry brachiopodal f-m xyn dolostone.

BASE OF UNIT 223.15 TOP OF UNIT 223.50 THICKNESS 0.35

UNIT H70. Weathering Character semi-prom. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character planar bedded. Composition dolostone w/ 0.2 mm xtal size. Sedimentary Structures planar bedded, bioturbation (3 mm wide 'tubes' at contact w/ overlying unit). Misc well indurated.

BASE OF UNIT 223.50 TOP OF UNIT 223.85 THICKNESS 0.35

UNIT Hf71. Weathering Character semi-prom. Colour WS & FS-m brownish grey. Basal Contact abrupt planar. Bedding Character indistinct, mottled. Bed/Parting Thickness mode 30 cm. Composition dolostone w/ 0.2 mm xtal size. Sedimentary Structures 3 mm-wide 'tubes'. Misc well indurated.

BASE OF UNIT 223.85 TOP OF UNIT 225.45 THICKNESS 1.60

UNIT Hf72. Weathering Character semi-rec. Colour WS & FS-m brownish grey, mottled. Basal Contact indet. Bedding Character mottled. Bed Parting Thickness min 2 cm, max 10 cm, mode 3 cm. Composition ls. Sedimentary Structures irregular bedding. Hf72 Sample/Slab/Thin Section Description (rep litho sample taken 0.75 m abu), fresh surface colour; mottled wk vlt yellowish-orange (10YR 7/2) and wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, convex-up structures as columnar stromatolites to 4 cm wide, are separated by about 3 cm, bioturbation (circular 'tubes' to 1.5 mm diameter) occur mainly in

areas between stromatolites. Stromatolites are composed of dolomitic/microsparitic f xyn sparite and have a clotted texture in thin section, mat'l between stromatolites consists of microsparitic/sparry f-m xyn dolomite, tr pyrite, 45% m xyn dolomite (75 μ m mode), calcified dolomite com, 1% porosity along stylolites. CL; dolomite luminesces dull orange-red and calcite is non-luminescent. FLUOR; fluorescent dolomite lines vugs, vug-filling dolomite is non-fluorescent. Rock Name: dolomitic/microsparitic f xyn sparite columnar stromatolites in a microsparitic sparry f xyn dolomite 'matrix'.

BASE OF UNIT 225.45 TOP OF UNIT 226.30 THICKNESS 0.85

UNIT Hf73. Weathering Character semi-rec. Basal Contact indet. Bedding Character planar lam. Bed Parting Thickness min 5 mm, max 40 mm, mode 15 mm. Composition calc dolostone (0.2 mm xtal size), <1% carb film on lams, black nodular chert horizon 1.25 m abu. Sedimentary Structures planar lam. Misc fissile. Hf73 Sample/Slab/Thin Section Description (rep litho sample taken 0.5 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; minor low-amplitude stylolites, 30% f xyn spar, m xyn dolomite xtals (150 μ m mode) have clear rims and inclusion-rich cores, calcified dolomite is very com, 5% porosity along and near stylolites. CL; dolomite luminesces dull orange-red and calcite is non-luminescent. Rock Name: sparry m xyn dolostone.

BASE OF UNIT 226.30 TOP OF UNIT 228.05 THICKNESS 1.75

UNIT Hf74. Semi-rec mottled m brownish grey and buff dolomitic ls.

BASE OF UNIT 228.05 TOP OF UNIT 228.20 THICKNESS 0.15

UNIT Hf75. Buff dolostone as for Hf73, possibly hummocky at top. Bed Parting Thickness min 5 cm, max 30 cm, mode 15 cm.

BASE OF UNIT 228.20 TOP OF UNIT 230.40 THICKNESS 2.20

UNIT Hf76. Weathering Character prom, forms ledge of waterfall. Colour WS & FS-buff. Basal Contact trans over 20 cm. Bedding Character mottled. Bed Parting Thickness min 3 cm, max 35 cm, mode 15 cm. Composition dolostone w/ 0.5 mm xtal size, 20-25% vugs, tr blue to purple fluorite, irregular carb mat'l (<1%) dispersed through sample, irregularly-shaped vugs to 1 cm in size. Fossils bioturbation w/ small 3 mm wide 'tubes', a solitary coral (2 cm across and 3 cm long) and a poorly preserved colonial coral. Misc bitumenous odour. Mi76 Scree Sample/Slab/Thin Section Description fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 15% intergrown c to vc purple fluorite xtals (to 1 mm in size) occur between 55% f-m xyn dolomite xtals (some of which are leached), 30% interxyn porosity. CL; bright blue and lt yellowish green luminescent fluorite, dolomite luminesces moderately orange-red. FLUOR; fluorescent fluorite. Rock Name: fluorite-bearing f-m xyn dolostone.

BASE OF UNIT 230.40 TOP OF UNIT 233.70 THICKNESS 3.30

UNIT Hf77. Weathering Character semi-rec. Colour WS & FS-lt buff. Basal Contact covered. Bedding Character vague planar lams to sl wavy. Bed Parting Thickness max 1 m, min 20 cm, mode 50 cm. Composition dolostone (0.2 mm xtal size). Sedimentary Structures vague planar to sl wavy lams. Misc well indurated, on other side of stream there is an anticline-syncline pair and a breccia pipe occurs 10 m to the south.

BASE OF UNIT 233.70 TOP OF UNIT 240.45 THICKNESS 6.75

UNIT Hf78. Weathering Character semi-prom. Colour WS & FS-m brown. Basal Contact covered. Bedding Character irregular. Bed Parting Thickness min 15 mm, max 150 mm, mode 60 mm. Composition dolomitic ls w/ minor carb mat'l, minor black chert nodules (4 by 2 cm). Sedimentary Structures irregular bedding. Fossils tr poorly preserved solitary and colonial corals. Misc fractured, bitumenous odour, unit overlies a breccia pipe. Hf78 Sample/Slab/Thin Section Description fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; high concentration of low-amplitude stylolites, composition; one solitary coral (1%) (22 mm diameter calyx), 3% ostracods to 0.5 mm in size and ostracod

frags, 1% ossicles, 1% brach moulds, 20% well preserved charophyte oogonia or (more likely) dasyclad algae to 2 mm long and 1 mm in diameter. 20% micrite and 29% microspar in a clotted texture, 10% spar, tr chert, 1% randomly distributed f xyn dolomite xtals, 5% porosity along stylolites and between xtals/gns. CL; a moderate orange-red luminescent 'matrix' between non-luminescent fossil frags, tr blue-luminescent fluorite after dolomite. Rock Name: micritic/sparry algal-rich biomicrosparite.

BASE OF UNIT 240.45 TOP OF UNIT 242.05 THICKNESS 1.60

K. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION I, MEASURED IN 1983.

Locality: 3.8 km west of Stanley Point Base Camp which is at latitude 73°49'03"N, longitude 85°32'W.

Latitude: 73°49'52"N.

Longitude: 85°39'00"W.

Section I occurs entirely in member B of the Baillarge Formation.

The top of unit I2 is taken as equivalent to the top of unit K2.

UNIT 11. Rec covered interval.

BASE OF UNIT 0.00 TOP OF UNIT 4.00 THICKNESS 4.00

UNIT 1a2. Weathering Character prom unit is traceable for hundreds of metres along the coast. Good bedding plane surfaces along creek walls, 20-m abu the unit weathers lt grey and mottles are less distinct, 22 m abu bedding becomes irregular. Colour WS & FS-mottled m brown. Basal Contact covered. Bedding Character mottles are elongate subparallel to bedding. Composition ls w/ <0.1 mm xtal size, 1% carb films. Sedimentary Structures mottles, stylolites form the boundary of a favositid coral (up to 2 cm of the coral may have dissolved). Fossils 1% ossicles, <1% brachs, favositid corals. Numerous thick-shelled brachs to 4 cm in size (30%) occur 13.5 m abu (sampled)-10% in place brachs w/ valves to 5 mm thick were found 27.0 m abu. A 10 cm-sized stromatoporoid occurs on a bedding plane surface. 1% favositid corals (13.5-18.5 m abu) are 2-20 cm in size and are both upright and overturned. Tr solitary corals (several collected w/ a 5 cm diameter), orthoconic nautiloids, stromatoporoids and brachs. Between 21 & 27.8 m abu there are well-preserved stromatoporoids that constitute approx 3-4% of the unit, most are in place but some are overturned. chain corals 28.5 m abu. Misc bitumenous odour, well developed pattern of subvertical joint surfaces. Some very minor orange-weathering mineralization (pyrite?) 27 m abu along joints. 1a2 Sample/Slab Description (taken 12-13.5 m abu), fresh surface colour; vdk olive brown (10YR 3/3), sedimentary structures; wispy mottles, minor high-amplitude stylolites, fossils; 10% ostracod frags and 1% articulated ostracods to 1 mm in size, 1% ossicles, tr plicated brach frags, one solitary coral (5 cm diameter calyx w/ at least 40 septa). 73% microspar, 5% spar, 5% f xyn dolomite is concentrated along/near wispy stylolites, 5% interxyn porosity especially near stylolites. Rock Name: sl sparry/sl dolomitic ostracodal biomicrosparite. 1a2a Sample/Slab/Thin Section Description (taken 12-13.5 m abu), fresh surface colour; wk vdk olive brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, composition; 3% algal frags (some branching), 1% ossicles, 1% brach frags, 5% articulated ostracods to 1.8 mm in size, 15% ostracod frags, 1 solitary coral (9 cm long w/ a 43 mm diameter calyx), has about 50 major and 50 minor septa. 30% peloids (composed of microspar) have a 50µm mode. 26% microspar, 5% spar fills fractures, 5% clear spar fills articulated ostracods, tr pyrite, 1% bitumen along stylolites, 6% f xyn dolomite (50 µm mode) near stylolites, minor calcified dolomite. 2% porosity along stylolites. CL; dull red-luminescent dolomite except for rare blue-luminescent fluorite after dolomite. Calcite, including fossils is non-luminescent. FLUOR; fluorescent scalenohedral vug-lining isopachous spar cement, vug-filling spar is not fluorescent. Rock Name: dolomitic sl sparry ostracodal biopelmicrosparite. 1a2b Sample/Slab Description (taken 12-13.5 m abu), fresh surface

colour; wk vdk olive brown (10YR 3/2), sedimentary structures; low-amplitude stylolites accentuated by bitumen, composition; 1% pentamerid brachs to 4 cm in size, valve microstructure consists of calcite prisms at right angles to valve boundaries, 3% ossicles, tr articulated ostracods to 1.5 mm, tr solitary corals (35 mm diameter calyx) to 80 mm long. 66% microspar, 5% spar, 1% bitumen occurs along stylolites and fills pores, tr pyrite, tr white chert replaces shell frags. 20% f xyn dolomite is concentrated along and near stylolites. 5% porosity near stylolites. Rock Name: mottled sl sparry/dolomitic fossil-bearing microsparite. 1a2c Sample/Slab Description (taken 12-13.5 m abu), fresh surface colour; wk dk olive brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 10% plicated pentamerid brachs to 45 mm in size (valves to 10 mm thick), tr thin-valved plicated brachs, 3% ostracods to 1.5 mm, tr ossicles to 2 mm in size have pentagonally star-shaped axial canals. 56% microspar. 10% spar fills ostracods and fractures. 1% bitumen along stylolites, tr pyrite, 15% f xyn dolomite occurs mainly along/near stylolites. 5% porosity along stylolites. Rock Name: dolomitic/sparry brachiopodal biomicrosparite. 12d Sample/Slab Description (taken 17.3 m abu), fresh surface colour; wk vdk olive brown (10YR 3/2), sedimentary structures; minor low-amplitude stylolites, composition; 10% phaceloid or possibly dendroid corals, calices to 3.2 mm in diameter, 1 solitary coral w/ 13 mm diameter calyx, 1% ossicles, 15% ostracods and ostracod frags, 5% tabular stromatoporoids, 55% microspar, 10% spar fills ostracods and fractures, tr pyrite, tr bitumen in pores, 15% dolomite (30µm modal xtal size). 5% porosity. Rock Name: dolomitic/ostracodal/sparry biomicrosparite. 1a2e Sample/Slab Description (taken about 17 m abu), fresh surface colour; wk vdk olive brown (10YR 3/2) and minor wk vlt yellowish orange (10YR 7/2), sedimentary structures; vugs to 15 mm in size are lined w/ vc xyn spar, lt buff chertified mottles, minor high-amplitude stylolites, minor subvertical spar-filled fractures, composition; solitary corals (calices to 24 mm in diameter and 40 mm long), tr ossicles and gastropods, 5% articulated ostracods to 3 mm max size (some w/ geopetal spar-over-microspar fabric), 10% ostracod frags, tr colonial corals. 10% spar fills fractures, 1% irregular white chert blebs are bounded by stylolites, tr m xyn pyrite is preferentially concentrated in chert blebs, 25% f xyn dolomite occurs near stylolites and is concentrated in mottles and in stylolite-bounded subvertical fracture zones. Rock Name: mottled dolomitic/sparry ostracodal biomicrosparite. 1a2e Sample/Slab Description of Phaceloid Coral (taken about 17 m abu), sedimentary structures; minor low-amplitude stylolites, composition; one phaceloid coral resembles *Syringopora* (has stolons), 50% of sample is coral, spar fills corallites. 20% microspar, 15% spar, tr bitumen along stylolites, 5% white chert replaces parts of corallites, 10% f xyn dolomite is concentrated between corallites in parts of the sample. 5% interxyn porosity. Rock Name: sl cherty dolomitic/sparry coralline biomicrosparite. Sample 1a2f taken for conodonts.

BASE OF UNIT 4.00 TOP OF UNIT 33.25 THICKNESS 29.25

UNIT 13. Rec covered interval.

BASE OF UNIT 33.25 TOP OF UNIT 42.25 THICKNESS 9.00

UNIT 1b4. Weathering Character semi-prom, semi-covered 4 m-wide outcrop. Colour WS & FS-mottled m brown. Basal Contact covered. Bedding Character mottled, contorted strata. Composition dolomitic ls. Sedimentary Structures mottles. Fossils bun-shaped randomly-oriented 10 cm-wide stromatoporoids, brach frags, tr colonial corals, one solitary coral.

BASE OF UNIT 42.25 TOP OF UNIT 45.70 THICKNESS 3.45

UNIT 1b5. Rec covered interval.

BASE OF UNIT 45.70 TOP OF UNIT 53.35 THICKNESS 7.65

UNIT 1b6. Weathering Character semi-prom 150 m wide outcrop. Colour WS & FS-lt brown. Basal Contact covered. Bedding Character planar lams are defined by carb film. Bed/Lam Thickness min 1 cm, max 11 cm, mode 4 cm. Bed Parting Thickness min 10 cm, max 60 cm, mode 20 cm. Composition vf xyn dolostone w/ <1% carb films. Sedimentary Structures planar lams, high-amplitude stylolites, hummocky structures 2 m abu. Fossils 2-3% ossicles,

echinoderm stems to 5 cm long and 1-2 mm wide, tr brachs, carb lams may represent cryptalgal lam. Misc outcrop is a syncline/anticline pair. Ib6 Sample/Slab/Thin Section Description (rep litho sample w/ echinoderm stems 1 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; minor low-amplitude stylolites, composition; tr echnoderm stems to 5 mm long, 5% ossicles to 0.5 mm. 5% microspar, tr f xyn spar, 85% aphanoxyn/vf xyn dolomite (5-10 μ m) xtal size, 5% interxyn porosity. CL; non-luminescent except for rare bright orange-luminescent subvertical veinlets. Rock Name: ossicle-bearing aphanoxyn/vf xyn dolostone.

BASE OF UNIT 53.35 TOP OF UNIT 56.65 THICKNESS 3.30

UNIT Ib7. Weathering Character semi-prom 150 m-wide outcrop. Colour WS & FS-m brown. Basal Contact abrupt planar (folded). Bedding Character planar. Bed Parting Thickness min 3 cm, max 15 cm, mode NA. Composition ls w/ <0.1 mm xtal size. Sedimentary Structures high-amplitude stylolites, planar bedding. Fossils occasional ossicles. Ib7 Sample/Slab/Thin Section Description (rep lith sample taken 0.30 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; minor high-amplitude (1 mm) stylolites w/ thick residue, composition; tr ostracods to 0.3 mm, tr ossicles, 10% sponge spicules(?), 35% peloids (composed of 10% micrite and 25% microspar) w/ a 200 μ mode. 10% micrite, 10% microspar, 10% spar occurs between 'peloids', 25% randomly dispersed f xyn dolomite (50 μ m mode), com calcified dolomite as composite microspar, a few dolomite rhombs are entirely replaced w/ clear composite microspar. Tr porosity. CL; dolomite luminesces a very dull orange-red except for 1% blue-luminescent fluorite after dolomite (preferentially in ossicles), calcite is non-luminescent. Rock Name: dolomitic pelmicrosparite.

BASE OF UNIT 56.65 TOP OF UNIT 57.35 THICKNESS 0.70

UNIT Ib8. Weathering Character semi-prom 150 m wide outcrop. Colour WS & FS-lt brown. Basal Contact abrupt planar (folded). Bedding Character very vague planar lams. Bed Parting Thickness variable, 15-65 cm thick. Composition dolostone w/ 0.2 mm xtal size, tr vugs. Sedimentary Structures very vague planar lams. Misc well indurated. Ib8 Sample/Slab/Thin Section Description (rep litho sample taken at base of unit), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; 5% spar and dolomite-filled vugs (to 5 mm in size), composition; 1% ostracods to 0.5 mm, spar lines inside of articulated ostracods, clear f xyn dolomite fills centers, 64% peloids (50 μ m mode, composed of 15% aphanoxyn and vf xyn dolomite), 5% very c xyn spar fills vugs to 5 mm in size, 15% f-m xyn spar fills interpeloid porosity, 5% clear dolomite lines spar-filled vugs. 10% interpeloid porosity. CL; non-luminescent except for rare bright orange-luminescent spar (pore-fillings?). FLUOR; fluorescent-zoned vug-filling spar. Rock Name: sparry peloidal aphano/vf xyn dolostone.

BASE OF UNIT 57.35 TOP OF UNIT 58.00 THICKNESS 0.65

L. FIELD-AND SAMPLE DESCRIPTIONS FOR SECTION J, STANLEY POINT, MEASURED IN 1983.

Locality: 19 km west of Stanley Point.

Latitude: 73°50'00"N.

Longitude: 85°42'00"W.

The base of the section starts in member B of the Baillarge Formation.
The base camp is 350 m south of Lancaster Sound and 25 m asl.

UNIT J1. Rec covered interval, sealevel is taken as 0.00 m in section J. Sample ScJ of large coiled nautiloid in scree near sealevel.

BASE OF UNIT 0.00 TOP OF UNIT 138.40 THICKNESS 138.40

UNIT J2. Weathering Character prom outcrop approx 50 m wide. Colour WS-m brown w/ limonitic staining. FS-m brown, mottled. Basal Contact covered. Bedding Character mottled to wispy lam. Bed Parting Thickness mode is 3 cm except in the upper 2 m where it is 5 cm. Composition sparsely fossiliferous ls w/ <0.1 mm xtal size (microspar?). 1% carb/bitumenous mat'l, tr vuggy porosity in gastropods. Sedimentary Structures wispy bedded, becomes mottled in upper 2 m. Fossils 1% gastropods on some bedding planes, <1% ossicles, <1% 1 cm-sized thin-shelled brachs. Misc bitumenous odour. J2 Sample/Slab/Thin Section Description (rep litho sample taken 5 m abu), fresh surface colour; mottled wk dk olive-brown (10YR 4/2) and wk xdk olive-brown (10YR 2/2), sedimentary structures; low-amplitude stylolites, dolomitic mottles, composition; 1% ostracods to 0.6 mm in size, 1% brach frags, tr ossicles. 10% micrite, 40% microspar, 5% spar (to vc xyn) fills fractures, 2% chalcedony partly replaces brach valves, 2% bitumen is concentrated along stylolites, between xtals in dolomitic mottles and in spar-lined fractures. 35% f xyn dolomite (50µm mode), minor calcified dolomite in the form of composite microspar in rare instances replaces cores of dolomite rhombs. 5% porosity along stylolites and between xtals/gns. CL; very dull orange-red luminescent fluorite after dolomite except for 4% blue-luminescent dolomite, microspar is non-luminescent. Rock Name: mottled sl sparry/sl bitumenous dolomitic microsparite. J2a Sample/Slab Description (rep litho sample taken at top of unit), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; low-amplitude stylolites, irregular dolomitic mottles to 2 cm in size, 5% 1 mm-sized 'tubes', composition; 1% articulated ostracods to 3.5 mm, 2% ostracod frags, 45% peloids composed of 10% micrite and 35% microspar. 20% microspar between peloids. 1% spar fills fractures and articulated ostracods. 1% bitumen occurs along stylolites and in dolomitic mottles. 25% f xyn dolomite is concentrated in cm-sized mottles and 1 mm-sized 'tubes'. 5% porosity along and near stylolites and in dolomitic mottles. Rock Name: mottled dolomitic pelmicrosparite. BASE OF UNIT 138.40 TOP OF UNIT 153.75 THICKNESS 15.35

UNIT J3. Rec covered interval.

BASE OF UNIT 153.75 TOP OF UNIT 178.25 THICKNESS 24.50

UNIT J4. Rec covered interval, moved laterally from outcrop A to B.

BASE OF UNIT 178.25 TOP OF UNIT 181.25 THICKNESS 3.00

UNIT J5. Weathering Character A most prom ledge-former, unit is traceable for kilometres along the coast. Colour WS-mottled m brown w/ irregular limonitic weathering patches. FS-m brown. Basal Contact covered. Bedding Character mottled. Bed Parting Thickness min 10 cm, max 2 m, mode 1 m, mode 5-10 cm between 53.25-54.75 m abu. Composition very f xyn ls w/ carb mat'l or tr bitumen. Sedimentary Structures high-amplitude stylolites, mottle size is 3 cm 33.75 m abu, becomes more distinctly mottled and grades to dolomitic ls upsection. Fossils 1-2% favositid corals, mostly in place, some overturned, max 1 m x 20 cm, min 6 x 3 cm, mode 20 x 4 cm. Large in place colonial corals, small ones are overturned, 1% bun to tabular shaped stromatoporoids, irregular and regrown, overturned and in place examples, avg 25 cm wide, 1-2% ossicles and echinoderm stems to 1 cm long, 1% or less solitary corals, in and out of place, tr gastropods, tr brachs, tr orthoconic nautiloids, 40.75 m abu-orthoconic-nautiloid 10 cm long & 3 cm wide, 45.75 m abu-orthocone frag-60% buff mottles, 47.25 m abu-chain coral 6 cm in size w/ 2 mm wide corallites, 57.25-58.75 m abu-5% articulated brachs 1 cm in size. Misc bitumenous odour, bitumen fills corals 5.50 m abu. Sample J5-conodont sample taken from the basal 3.75 m of the unit. J5a Sample/Slab/Thin Section Description (rep litho sample taken 3.75 m abu), fresh surface colour; mainly wk vdk olive-brown (10YR 3/2) w/ wk lt olive-brown (10YR 6/2) stromatoporoids, sedimentary structures; cm-sized irregularly-shaped mottles skirt stromatoporoids, low-amplitude stylolites are accentuated w/ bitumen, minor high-amplitude stylolites, stylolites form the boundaries of dolomitic mottles, composition; 3% articulated ostracods to 4.5 mm in diameter, 7% ostracod frags, one solitary coral w/ 8 mm diameter calyx, coral walls are partly silicified, 30% tabular and spheroidal well-preserved stromatoporoids, white silica in part replaces brach frags, 2% favositid coral frags. 19% microspar and 5% spar fills corallites and fractures. 1% bitumen is concentrated

along stylolites and in interxyn pores in dolomitic mottles, subvertical fractures terminate above and below at stylolites, minor c xyn spar occurs along fractures where stromatoporoid is recrystallized, 30% f-m xyn dolomite is concentrated in cm-sized irregularly-shaped dolomitic mottles, minor calcified dolomite (clear microspar 'inclusions'). 3% porosity along stylolites and subvertical fractures. CL; very dull orange-red luminescent dolomite, calcite is non-luminescent. FLUOR; fluorescent scalenohedral spar lines pores. Rock Name: mottled dolomitic stromatoporoidal biomicrosparite crackle breccia. J5b Sample/Slab Description (regrown stromatoporoid taken 16.3 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2) and wk vdk olive brown (10YR 3/2), sedimentary structures; 30% cm-sized dolomitic mottles, composition; 1% ossicles w/ 5-point star-shaped axial canals, tr stems to 2 mm long, 10% ostracod frags, 3% articulated ostracods to 2 mm long, tr plicated brach frags, tr well-preserved solitary coral w/ 0.8 mm diameter calyx, tr *Catenipora* frag, 5% stromatoporoid 52 mm in size (spheroidal 'nucleus' w/ pronounced overgrowth on one side). 31% microspar, 5% spar, 25% m xyn dolomite in mottles and along stylolites/fractures. 20% porosity along stylolites/fractures and especially between xtals/gns in the dolomitic mottles. Rock Name: mottled dolomitic/sl sparry/ostracodal biomicrosparite. J5c Sample Description (colonial coral taken 39.75 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; dolomitic mottles, composition; one favositid coral to 90 mm in size, corallites to 1.5 mm in size, tr ossicles to 4 mm in diameter. Rock Name: dolomitic mottled ls contains a favositid coral.

BASE OF UNIT 181.25 TOP OF UNIT 240.00 THICKNESS 58.75

The top of J5 is taken as the contact between the Baillarge and Cape Crauford formations.

UNIT J6. Rec covered interval.

BASE OF UNIT 240.00 TOP OF UNIT 246.25 THICKNESS 6.25

UNIT J7. Weathering Character semi-prom 5 m-wide outcrop. Colour WS-lt buff, FS-vlt buff. Basal Contact covered. Bedding Character vague lams. Composition dolostone. Sedimentary Structures vague lams. Misc open fold 1 m wide w/ 5 cm amplitude. J7 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; wk lt olive-brown (10YR 6/2), composition; 35% microspar, 50% f xyn dolomite, minor calcified dolomite. 15% porosity. CL; dolomite luminesces very dull orange-red, calcite is non-luminescent. Rock Name: microsparitic f xyn dolostone.

BASE OF UNIT 246.25 TOP OF UNIT 246.65 THICKNESS 0.40

UNIT J8. Weathering Character prom. Colour WS-interbedded/interlam lt buff to m gy, irregular yellowish-orange limonitic stain on bedding plane surfaces. FS-aa but no orange stain. Basal Contact abrupt (truncates lams in unit Jb7, sl irregular). Bedding Character planar, laterally continuous except where deformed, locally mosaic to rubble breccia. Bed Parting Thickness min 1 cm, max 30 cm, mode 5 cm. Bed/Lam Thickness interlam part of unit has a 5 mm mode. Composition ls, very powdery, tr carb film. Sedimentary Structures lam, locally brecciated w/ tension gashes. Misc entire unit is deformed & fractured.

BASE OF UNIT 246.65 TOP OF UNIT 247.85 THICKNESS 1.20

UNIT J9. Weathering Character prom unit is traceable for hundreds of metres. Colour WS & FS-buff. Basal Contact abrupt planar. Bedding Character vaguely lam. Bed Parting Thickness min 4 cm, max 25 cm, mode 8 cm. Bed/Lam Thickness vague 5 mm lam mode. Composition calc dolostone w/ <0.1 mm xtal size. Sedimentary Structures vague lam. Misc well indurated, very homogeneous throughout.

BASE OF UNIT 247.85 TOP OF UNIT 248.60 THICKNESS 0.75

UNIT J10. Weathering Character prom unit is traceable for kilometres along the coast. Colour WS-m brown w/ rusty yellow irregular mottles. FS-m brown w/ black residue (as a film) on bedding surfaces. Basal Contact trans over 25 cm, from planar to irregular bedding. Bedding Character vaguely bedded, becomes mottled 25 cm abu. Bed Parting Thickness min 2 cm, max

3 cm. Composition dolomitic ls w/ irregular carb(?) films, xtal size <0.05 mm. Sedimentary Structures vaguely lam at base, mottled.

BASE OF UNIT 248.60 TOP OF UNIT 253.25 THICKNESS 4.65

UNIT J11. Weathering Character prom, outcrop is 3-4 m wide and semi-covered. Colour WS-m brown, FS-m to dk brown. Basal Contact indet. Bedding Character vague bedding. Bed Parting Thickness max 30 cm, min 4 cm, mode 10 cm. Composition very sl calc dolostone is trans to calc dolostone at top of unit, <50µm xtal size. Sedimentary Structures vague planar bedding. Misc well indurated.

BASE OF UNIT 253.25 TOP OF UNIT 256.55 THICKNESS 3.30

UNIT J12. Weathering Character prom, outcrop traceable for kilometres in coastal cliff exposures. Cavernous weathering. Colour WS & FS-variably m brown and rusty yellow. Basal Contact trans over 2 m. Bedding Character lam where visible. Bed Parting Thickness min 1 cm, max 4 cm, mode 1.5 cm. Composition dolomitic ls w/ <50µm xtal size. Sedimentary Structures planar lam. Fossils solitary corals (collected) 2.0 m abu as well as a favositid coral 2.15 m abu. J12 Sample/Slab/Thin Section Description (taken of solitary corals 2.0 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; high concentration of low-amplitude stylolites, composition; 5% solitary corals to 12 mm in diameter, 10% brach frags and possibly ostracod valve frags, 1% articulated ostracods to 1 mm in size, 2% ossicles, one unidentified spiral-like organism (0.8 mm long by 0.1 mm wide). 55% peloids (composed of 10% micrite and 45% microspar). 15% microspar between peloids, 5% f-c xyn spar veinlets cross-cut and displace stylolites. The highest concentration of spar occurs where the distance between stylolites is a minimum. 2% chert replaces fossil frags, tr pyrite, 5% porosity along stylolites and subvertical fractures. CL; non-luminescent except for a complex-zoned spar filling a subvertical fracture lined with non-luminescent spar. FLUOR; vug-lining scalenohedral spar (isopachous cement), vug-filling spar is zoned. Rock Name: sl sparry/fossiliferous pelmicrosparite.

BASE OF UNIT 256.55 TOP OF UNIT 262.30 THICKNESS 5.75

UNIT J13. Rec covered interval.

BASE OF UNIT 262.30 TOP OF UNIT 268.80 THICKNESS 6.50

UNIT J14. Weathering Character semi-rec, outcrop is 5 m wide and partly covered w/ talus. Colour WS-variable rusty brown, FS-m brown. Basal Contact covered. Composition breccia, 75% 'clasts', 10% 'matrix', 15% mainly fracture porosity. Clast composition-dolostone to calc dolostone, clast size-min 3 mm, max 1 m, mode 10 cm, ang to sbang clasts, orientation indet. Sedimentary Structures subvertical high-amplitude columnar stylolites define a lineation plunging 70° and trending in various directions. Misc fractured.

BASE OF UNIT 268.80 TOP OF UNIT 270.30 THICKNESS 1.50

UNIT J15. Rec covered interval.

BASE OF UNIT 270.30 TOP OF UNIT 271.55 THICKNESS 1.25

UNIT J16. Weathering Character semi-rec, semi-covered 2 m-wide outcrop. Colour WS & FS-m brown. Basal Contact covered. Composition dolomitic ls.

BASE OF UNIT 271.55 TOP OF UNIT 272.30 THICKNESS 0.75

UNIT J17. Rec covered interval.

BASE OF UNIT 272.30 TOP OF UNIT 286.65 THICKNESS 14.35

UNIT J18. Weathering Character prom unit is traceable for kilometres along the coast. Colour WS & FS-lt brown. Basal Contact covered. Bedding Character planar bedded, in part convex-up structures (to 40 cm wide and 10 cm high). Bed Parting Thickness mode 1.0 m. Composition dolostone, rd intraclasts, locally dolomitized crackle to mosaic breccia (1-2 cm clast size). Sedimentary Structures planar bedding, in part convex-up structures (to 40 cm

wide and 10 cm high), locally brecciated. Misc dip is gently north. J18 Sample/Slab/Thin Section Description (rep litho sample taken 0.75 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), composition; 10% disarticulated brach frags to 4 mm in size, 3% f xyn spar, 59% f-m xyn dolomite xtals, most of which are lath-shaped, 75 μ m mode, calcified dolomite is com in spar-filled areas. 25% vugs to 1 mm in size, 3% fracture porosity; CL; dull orange-red luminescent spar w/ minor small patchy areas of bright orange-luminescent spar. Rock Name: vuggy/sl sparry brachiopodal f-m xyn dolostone.
BASE OF UNIT 286.65 TOP OF UNIT 288.35 THICKNESS 1.70

UNIT J19. Weathering Character prom unit is traceable for kilometres along the coast. Colour WS & FS-m brown. Basal Contact truncates lower unit by brecciation. Bedding Character locally brecciated, otherwise planar lam. Bed/Lam Thickness min 5 mm, max 15 mm. Composition dolomitic ls, locally brecciated, xtal size ≤ 0.05 mm, 10% fracture porosity. Sedimentary Structures planar lam, locally fractured to brecciated. Fossils tr small colonial corals. Misc may be near breccia pipe because of deformation. Sample J19 taken for conodonts.
BASE OF UNIT 288.35 TOP OF UNIT 290.45 THICKNESS 2.10

UNIT J20. Weathering Character prom, outcrop traceable for kilometres along the coast. Colour WS-variable m brown to buff w/ rusty patches. FS-buff. Basal Contact deformed, irregular as for previous unit. Bedding Character planar lam, locally brecciated. Bed/Lam Thickness 3 mm mode. Composition dolostone, locally brecciated. Sedimentary Structures planar lam, locally brecciated. Misc structurally deformed, brecciated w/ minor folds, good fissility due to bedding plane slip. There is considerable fracturing at the edge of the breccia pipe.
BASE OF UNIT 290.45 TOP OF UNIT 293.55 THICKNESS 3.10

UNIT J21. Weathering Character prom. Colour WS-mottled m brown w/ rusty staining on joint surfaces. FS-mottled m brown. Basal Contact abrupt planar (deformed into irregular contact over 40 m). Bedding Character mottled crackle breccia. Bed/Parting Thickness mode 3 m, between 9.45 & 12.45 m abu parting thickness is as follows; min 3 cm, max 3 m, mode 20 cm. Composition sparsely fossiliferous dolomitic ls, f disseminated ferruginous mat'l stains rock. Sedimentary Structures 60% dk, 40% lt mottles (2 cm modal size) are elongate parallel to bedding, vugs to 3 cm. Fossils 0.5% stromatoporoids, 1-2% ossicles, 1 cm long echinoderm stem, orthoconic nautiloid 4 m abu, solitary coral, high-spired gastropod 6.45 m abu, colonial coral. Brachs resemble *Atrypa* sp. J21 Sample/Slab/Thin Section Description (rep litho sample taken 4 m abu), fresh surface colour; mottled wk vlt orangy yellow (2.5Y 7/2) and wk dk brownish olive (2.5Y 4/2), sedimentary structures; breccia related vugs to 3 cm in size are elongate parallel to stratification. Note that areas up to 15 mm from boundaries are very porous. Some dolomitic mottles are offset by small faults, composition; 3% ossicles w/ 5-point star-shaped axial canals, ostracod valve frags, 1% gastropods to 5 mm in size, 1% solitary corals (to 6 mm long), 15% ossicles and tr echinoderm stems to 10 mm long, 1% smooth brachs to 6 mm in size, tr 10 mm long *Catenipora* frag, one solitary coral forms the nucleus around which a spheroidal stromatoporoid has grown. 7% microspar, 11% c-very c clear spar, 1% chalcedony, many subvertical fractures terminate at stylolites that have been altered to thick laterally continuous porous dolomitic zones. Note that clasts and matrix are trans into each other and therefore difficult to distinguish, 30% m xyn dolomite, very extensive calcified dolomite is dissolved to form vugs. 30% porosity. CL; bright orange-luminescent spar in vugs, along fractures and between clasts. Rock Name: vuggy/sparry fossiliferous m xyn dolostone crackle breccia.
BASE OF UNIT 293.55 TOP OF UNIT 309.80 THICKNESS 16.25

UNIT J22. Weathering Character prom. Colour WS-m to dk brown w/ rusty to grey patches. FS-m brown. Basal Contact trans over 10 cm. Bedding Character planar lam. Bed/Lam Thickness min 0.5 mm, max 2 mm, mode 1 mm. Bed Parting Thickness mode 5 cm. Composition calc dolostone w/ 0.1 mm xtal size, disseminated carb mat'l. Sedimentary

Structures planar lam. Fossils low-spired gastropods 0.5 cm in size. Misc bitumenous odour.
BASE OF UNIT 309.80 TOP OF UNIT 310.90 THICKNESS 1.10

UNIT J23. Crackle breccia as for J21 but is less fossiliferous (1% ossicles).
BASE OF UNIT 310.90 TOP OF UNIT 315.30 THICKNESS 4.40

UNIT J24. Weathering Character prom outcrop as for previous unit. Colour WS-m brown rusty colour accentuates bedding planes. FS-m brownish grey. Basal Contact trans over 10 cm from mottled to bedded. Bedding Character planar lam. Bed Parting Thickness trans, mode 15 cm, min 3 cm, max 20 cm of basal ls. Above 1 m abu stratal parting thickness is min 2 mm, max 2 cm, mode 1 cm. Composition ls, very thin carb films on some bedding planes, <0.1 mm xtal size, 1% bitumen. Sedimentary Structures planar lam. Fossils brach frags. Misc very fissile, bitumenous odour, zone of deformation from 3.8 to 4.0 m abu. J24 Sample/Slab/Thin Section Description. (rep litho sample taken 1 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), sedimentary structures; planar to sl wavy lam, lam thickness mode 5 mm, tangential cross-lams and normal grading of peloids, minor scouring, tr low-amplitude stylolites, tr vugs, composition; tr ostracods, 63% peloids (composed of 10% micrite and 53% microspar, size range 25-100µm, mode 35µm). 20% microspar, 5% f-c xyn spar between or replacing peloids, tr bitumen lines fractures and fills vugs, 10% dolomite to 75µm in size, excellent examples of calcified dolomite is com (as composite clear microspar after dolomite), 2% porosity. CL; dolomite luminesces very dull red, calcite is non-luminescent except for one bright orange-luminescent spar fracture-filling veinlet. FLUOR; fluorescent spar coats peloids. Rock Name: sl sparry/dolomitic pelmicrosparite.
BASE OF UNIT 315.30 TOP OF UNIT 319.70 THICKNESS 4.40

UNIT J25. Mottled dolomitic ls.
BASE OF UNIT 319.70 TOP OF UNIT 320.00 THICKNESS 0.30

UNIT J26. Bedded ls as for unit J24, deformed in places.
BASE OF UNIT 320.00 TOP OF UNIT 320.25 THICKNESS 0.25

UNIT J27. Mottled dolomitic ls as for unit J21.
BASE OF UNIT 320.25 TOP OF UNIT 321.35 THICKNESS 1.10

UNIT J28. Prom bedded ls as for unit J24.
BASE OF UNIT 321.35 TOP OF UNIT 323.60 THICKNESS 2.25

UNIT J28a. Weathering Character prom. Basal Contact planar abrupt. Bedding Character vague planar lams, faulted and fractured. Bed/Lam Thickness 5 mm mode. Bed Parting Thickness min 3 cm, max 15 cm, mode 8 cm. Composition ls (<0.05 mm xtal size), veinlets of breccia. Sedimentary Structures planar lams. Misc deformation 1 m abu, microfaults w/ 1 cm apparent displacement. J28a Sample/Slab/Thin Section Description (taken from top of unit), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; 5% 1 mm-sized vugs, composition; 1% microspar fills minor fractures parallel to bedding, 1% brown interxyn organic matter, 73% vf, xyn dolomite, 5% vugs to 0.5 mm in size, 20% interxyn porosity, especially high in zones around vugs. CL; non-luminescent. Rock Name: vuggy vf xyn dolostone.
BASE OF UNIT 323.60 TOP OF UNIT 325.00 THICKNESS 1.40

UNIT J29. Weathering Character prom. Colour WS-m grey w/ yellowish orange weathering patches on joint surfaces. FS-m grey. Basal Contact abrupt, locally deformed. Bedding Character planar irregular. Bed Parting Thickness 3 cm mode. Composition calc dolostone (<50µm xtal size). Sedimentary Structures planar irregular bedding. Fossils small solitary corals and small (3 cm wide and 2 cm high) colonial corals. J29 Sample/Slab/Thin Section Description (rep litho sample and solitary coral taken 0.5 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 1

articulated ostracod 5.5 mm in size, 10% ostracod frags, 1 solitary coral w/ a 20 mm diameter calyx, 1% ossicles. 74% peloids (composed of 20% micrite and 54% microspar), 15% f-c xyn spar between peloids and peloid aggregates, tr spar fills articulated ostracod, tr chert, subvertical fractures terminate above and below at stylolites, tr vf xyn dolomite. CL; non-luminescent. FLUOR; vug-filling dolomite, fluorescent syntaxial overgrowths on an ossicle, scalenohedral fluorescent vug-lining isopachous spar cement. Rock Name: pelmicrosparite.

BASE OF UNIT 325.00 TOP OF UNIT 326.65 THICKNESS 1.65

UNIT J30. Prom lam dolomitic ls.

BASE OF UNIT 326.65 TOP OF UNIT 327.50 THICKNESS 0.85

UNIT J31. Prom mottled dolomitic ls w/ minor planar lams (70% mottled, 30% lam). One plicated brach (2 cm in size) 0.75 m abu.

BASE OF UNIT 327.50 TOP OF UNIT 329.35 THICKNESS 1.85

UNIT J32. Prom dolomitic ls as for J30, high-amplitude stylolites 2.25 m abu. Red stain on bedding surfaces. Unfossiliferous ls 7.65 m abu. Bed Parting Thickness min 2 cm, max 6 cm, mode 3 cm.

BASE OF UNIT 329.35 TOP OF UNIT 340.10 THICKNESS 10.75

UNIT J33. Weathering Character prom, outcrop as for previous unit. Colour WS-m brownish grey to rusty (limonitic) staining on 30% of surface. FS-m brownish grey. Basal Contact trans planar over 0.5 m. Bedding Character mottled. Composition calc dolostone w/ <50µm xtal size. Sedimentary Structures mottles, high-amplitude stylolites. Fossils *Catenipora* 1.5 m abu. Misc red colour (hematite?) on stratal parting surfaces. J33 Sample/Slab/Thin Section Description (rep litho sample w/ chain coral taken 1.5 m abu), fresh surface colour; mottled wk vlt yellowish orange (10YR 7/2) and wk m olive-brown (10YR 5/2), sedimentary structures; high-amplitude (to 2 mm) stylolites, cm-sized dolomitic mottles, composition; 5% *Catenipora* frags, one of which has been partly dissolved and faulted against a stylolite, some corallites of *Catenipora* are lined w/ m xyn spar and filled w/ m xyn polyxyn quartz, 3% ossicles, tr brach frags (one 3 mm-sized articulated and plicated brach frag), tr stick bryozoan frag 1.5 mm thick and 8 mm long, tr spar-filled articulated ostracods. 5% micrite, 62% microspar, 15% f-m xyn spar mainly fills subvertical fractures, 2% interxyn organic matter, numerous subvertical fractures (some spar-filled) terminate at stylolites, 3% vf xyn dolomite, 5% porosity along fractures and stylolites. CL; very dull orange-red luminescence except for bright orange-luminescent calcite overgrowths on vug-filling spar. FLUOR; 5% pore-filling fluorescent spar. Rock Name: mottled sl micritic/sparry fossiliferous microsparite. J33a Sample/Slab/Thin Section Description (taken 3 m abu), fresh surface colour; mottled wk vlt yellowish orange (10YR 7/2) and wk olive brown (10YR 5/2), sedimentary structures; high-amplitude stylolites, composition; tr solitary coral frags, 18% favositid corals to 17 mm thick and at least 65 mm long, coral structure has collapsed, 5% articulated ostracods to 1 mm in size, 5% ostracod frags, tr ossicles, 25% peloids (composed of microspar). 19% microspar between peloids, 20% f xyn spar fills space between peloids and peloid aggregates, c xyn spar fills corallites. 3% polyxyn quartz, cement in corallites is complex, including a lining of f xyn spar, then m xyn quartz, then c xyn spar, misc; subvertical fractures com terminate at stylolites, 'kink' cleavage in spar is probably a result of vertically-directed overburden stress because this cleavage is apparent in the collapsed favositid coral walls. Kinks occur not only in walls but also in spar lining corallites. Tabulae are folded and broken, spar is therefore a pre-brecciation cement. 2% dolomite replaces or partly replaces ostracod and coral skeletons. 5% porosity along fractures and stylolites, tr interxyn porosity. CL; generally dull orange-red luminescence, 30% vug-filling spar has complex-zoned bright orange-luminescent overgrowths. FLUOR; fluorescent scalenohedral spar lines corallites (isopachous cement), spar filling corallites is not fluorescent. Rock Name: mottled microsparitic coral-bearing biopelsparite.

BASE OF UNIT 340.10 TOP OF UNIT 347.30 THICKNESS 7.20

UNIT J34. Weathering Character prom. Colour WS-red staining on parting surfaces (hematite?). Bedding Character planar. Bed Thickness min 1 cm, max 10 cm, mode 4 cm. Composition calc dolostone. J34 Sample/Slab/Thin Section Description (rep litho sample taken 2.7 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 10% micrite, 80% microspar, 1% spar, 2% brown interxyn mat'l, 1% dispersed aphano-vf xyn dolomite, 1% dolomite is concentrated alongside stylolites. 5% interxyn porosity. CL; generally dull red-luminescent. Rock Name: micritic microsparite.

BASE OF UNIT 347.30 TOP OF UNIT 352.50 THICKNESS 5.20

UNIT J35. Weathering Character prom, outcrop as for previous unit. Colour WS-variable m grey w/ rusty staining. FS-m brown. Basal Contact abrupt wavy, 1-2 m wavelength, 20 cm amplitude. Bedding Character unbedded. Composition dolomitic ls, <0.1 mm xtal size, 5% small vugs <1 mm in size. Sedimentary Structures vugs. Misc variable thickness, 'boudinaged' appearance. Sample J35 taken for conodonts.

BASE OF UNIT 352.50 TOP OF UNIT 353.10 THICKNESS 0.60

UNIT J36. Weathering Character semi-prom, dendritic pyrolusite(?) on bedding plane surfaces. Colour WS-m brown w/ rusty patches. FS-m brown. Basal Contact abrupt wavy, (2 m wavelength, 20 cm amplitude). Bedding Character planar lam, laterally continuous for metres, locally brecciated. Bed/Lam Thickness min 2, max 10, mode 8 mm. Bed Parting Thickness min 4 mm, max 2 cm, mode 1 cm. Composition dolomitic ls (<0.1 mm xtal size), locally crackle breccia. Sedimentary Structures planar lam w/ tight kink folds.

BASE OF UNIT 353.10 TOP OF UNIT 354.95 THICKNESS 1.85

UNIT J37. Weathering Character prom outcrop as for previous unit. Colour WS-rust-coloured from a distance, m grey w/ rusty mottles up close. FS-m brown. Basal Contact wavy abrupt, wavelength 3 m, amplitude 10 cm. Bedding Character crackle breccia at base grades to rubble breccia 2 m abu. Composition ls breccia w/ ang to sbang randomly-oriented clasts, 10% interclast porosity, 10% 'matrix', <100µm xtal size. Clast size-min 2 mm, max 2 cm, mode NA. Sedimentary Structures high-amplitude stylolites throughout. Misc unit J37 varies laterally in thickness and resembles boudinage due to differential dissolution along the unit. J37 Sample/Slab/Thin Section Description (rep litho sample w/ stylolites taken at base of unit), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; pervasive very high amplitude (to 6 mm) stylolites grading to breccia, irregularly-shaped vugs occur to 4 mm in size along stylolites, composition; 70% microspar to m xyn spar, a clotted texture occurs between microspar/f xyn spar and m xyn spar, 5% c xyn quartz fills vugs, 'clasts' and 'matrix' are difficult to distinguish, subvertical fractures com terminate at stylolites or at vugs along stylolites. 25% porosity along stylolites and between clasts, breccia 'clast' size is indistinct, possibly has a 5 mm mode. Rock Name: sl quartzitic/microsparitic f-m xyn sparite 'clast & matrix' crackle breccia.

BASE OF UNIT 354.95 TOP OF UNIT 359.00 THICKNESS 4.05

UNIT J38. Rec covered interval.

BASE OF UNIT 359.00 TOP OF UNIT 362.10 THICKNESS 3.10

UNIT J39. Rec covered interval.

BASE OF UNIT 362.10 TOP OF UNIT 365.85 THICKNESS 3.75

UNIT J40. Weathering Character semi-rec very poor outcrop. Colour FS-brown. Composition calc dolostone.

BASE OF UNIT 365.85 TOP OF UNIT 366.85 THICKNESS 1.00

UNIT J41. Rec covered interval.

BASE OF UNIT 366.85 TOP OF UNIT 372.65 THICKNESS 5.80

UNIT J42. Weathering Character semi-prom, unit is traceable laterally for hundreds of metres. Colour WS-m brownish grey w/ rusty brown irregular mottles. FS-m brown. Basal Contact covered. Bedding Character planar lam/bedded. Bed/Lam Parting Thickness min 1 cm, max 60 cm, mode 10 cm. Composition sparsely fossiliferous ls (xtal size $<50\mu\text{m}$), 2% vugs to 1 cm, lined w/ 1 mm sized spar. Concretionary horizon 1.3 m abu, contains 2-15 cm long by 1.5 cm thick concretions. Sedimentary Structures planar bedding. Fossils 1-2% ossicles, tr echinoderm stems to 1 cm long, trend 20°, tr brachs. Misc veins and veinlets of white spar to 2 mm in size. J42 Sample/Slab/Thin Section Description (rep litho sample taken 1 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 4% ossicles, some w/ 5-point star-shaped axial canals, 4% articulated ostracods to 1 mm in size (rarely to 4 mm), filled w/ spar, 2% ostracod frags, tr brach frags, 68% peloids (composed of 30% micrite and 38% microspar, size mode $50\mu\text{m}$, range 25-75 μm). 5% microspar, 15% f-m xyn spar fills subvertical fractures that terminate at stylolites, 3% f xyn dolomite occurs between peloids and peloid aggregates, dolomite replaces some ls beside fractures. Tr porosity. CL; generally a very dull red luminescence. FLUOR; fluorescent overgrowths on ossicles, clear spar between peloids is non-fluorescent. Rock Name: sl microsparitic/fossiliferous pelsparite.
BASE OF UNIT 372.65 TOP OF UNIT 375.95 THICKNESS 3.30

UNIT J43. Weathering Character semi-prom 1-2 m wide outcrop. Colour WS-buff w/ rusty patches, FS-buff. Basal Contact abrupt planar (deformed). Composition ls breccia w/ 10% porosity. Sedimentary Structures subvertical high-amplitude stylolites throughout. Misc well indurated.
BASE OF UNIT 375.95 TOP OF UNIT 376.85 THICKNESS 0.90

UNIT J44. Rec covered interval.
BASE OF UNIT 376.85 TOP OF UNIT 377.75 THICKNESS 0.90

UNIT J45. Weathering Character semi-prom but prom 3 m abu, unit is traceable for kilometres. Colour WS-variable m brownish grey and rusty brown, m grey from a distance. FS-variable, some buff clasts, some are m brownish grey. Basal Contact covered. Bedding Character rubble breccia. Composition rubble breccia, 75% 'clasts', 15% 'matrix', 10% porosity, 60% of clasts are m brownish grey, 15% are buff. Clast size-min 5 mm, max 40 cm, mode 20 cm, clasts are randomly oriented, ang to sbang. The m brownish grey clasts are calc dolostone, buff 'clasts' are dolostone, 'matrix' is calc. Sedimentary Structures high-amplitude stylolites. Fossils ossicles, echinoderm stem 1 cm long and 0.5 cm in diameter. Misc breccia veins throughout unit, clasts in veins are small. J45 Sample/Slab/Thin Section Description (rep litho sample taken 1.5 m abu), fresh surface colour; overall vlt yellowish orange (10YR 7/3), yellowish orange residue along stylolites, sedimentary structures; high-amplitude stylolites, 10% vugs to 1 cm, composition; breccia, tr echinoderm stem, 2% f xyn dolomite. 15% vugs to 1 cm and 5% porosity between clasts and along stylolites/fractures. 10% grey chert clasts are clast-supported, many of the smaller clasts are composed of microspar, some clasts, especially the smaller ones have parts of their extremities replaced by microspar. It is therefore difficult to distinguish 'clasts' from f xyn sparite 'matrix', min clast size 2 mm, max 7 cm, mode 1-2 cm, some clasts are recrystallized to spar which makes it difficult to distinguish sparry 'matrix' from 'clasts', in rare instances 'clasts' are limonitic. Subvertical fractures com terminate at stylolites and spar-filled fractures com pervade clasts. CL; about 30% multi-fold complex-zoned vug-filling spar between dull red luminescent breccia clasts. FLUOR; spar 'matrix' between clasts is clear and zoned. Rock Name: micritic microsparite to f xyn sparite 'clast'-sparite 'matrix' mosaic to rubble breccia.
BASE OF UNIT 377.75 TOP OF UNIT 383.35 THICKNESS 5.60

UNIT J46. Weathering Character prom outcrop as for previous unit. Colour WS-lt buff w/ minor rusty patches, FS-buff. Basal Contact abrupt wavy w/ collapses into underlying unit. Composition ls mosaic to rubble breccia-'clasts' and 'matrix' are difficult to differentiate, 35% clast moulds. Clast orientation random, dissolved clasts-mode 2 cm, sbang moulds.

Sedimentary Structures columnar stylolites. Misc clasts weather out on surface. J46 Sample/Slab/Thin Section Description (rep litho sample taken 1.5 m abu), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; 2 cm-sized vugs (clast moulds), 1% limonite, tr malachite lines clast moulds, composition; breccia, both 'clasts' and 'matrix' consist of spar, 30% porosity due to clast moulds (centers of some clasts are preferentially dissolved and lined w/ clear m xyn spar), 15% interxyn porosity, clast moulds to 2 cm in size, clast size ranges from 2 to 20 mm (mode 10 mm). CL; many of the clast moulds and partial clast moulds are filled w/ a complex multi-fold zoned composite spar. The 'matrix' between clasts has a very dull orange-red luminescence. Rock Name: sparite ('matrix' and 'clast') mosaic breccia.

BASE OF UNIT 383.35 TOP OF UNIT 385.20 THICKNESS 1.85

UNIT J47. Rec covered interval.

BASE OF UNIT 385.20 TOP OF UNIT 385.70 THICKNESS 0.50

UNIT J48. Weathering Character prom, outcrop as for previous unit. Colour WS-m brown at a distance, at close range is variable m brown w/ rusty patches. FS-m brown. Basal Contact covered, wavy on a small scale. Composition mosaic to rubble breccia (bedded in places), 10% porosity, 15% 'matrix', 75% randomly oriented ang to sbang ls clasts, (min 3-4 mm, max 10 cm, mode 3-4 cm), Fossils tr colonial coral (4X5 cm), tr 1 cm-sized solitary corals, tr ossicles and shell frags. Misc sl bitumenous odour. Bed Thickness min 3 mm, max 20 cm, mode 5 cm. Bedding Character vague, as for parting. J48 Sample/Slab Description (rep litho sample taken from bedded part 3 m abu), fresh surface colour; vw dk olive-brown (10YR 4/1), sedimentary structures; minor low-amplitude stylolites, composition; 60% articulated ostracods to 7 mm in size, filled w/ peloids and spar (some w/ geopetal fabric of spar over peloids), 10% ossicles, some w/ 5-point star-shaped axial canals. 25% spar between ostracods. 5% fracture porosity, misc; subvertical fractures. Rock Name: ostracodal biosparite.

BASE OF UNIT 385.70 TOP OF UNIT 390.55 THICKNESS 4.85

UNIT J49. Rec covered interval.

BASE OF UNIT 390.55 TOP OF UNIT 395.85 THICKNESS 5.30

UNIT J50. Weathering Character prom outcrop is 3 m wide, unit is traceable in buttress-like outcrops along the coast. Colour WS & FS-buff. Basal Contact covered. Bedding Character planar lam. Bed Parting Thickness min 1 cm, max 15 cm, mode 5 cm. About 6.25 m abu mode changes to 25 cm. Bed/Lam Thickness very vague (mode 4-5 cm). Composition dolomitic ls to ls. Sedimentary Structures planar lam, stylolites throughout unit. Misc kink fold 3 m abu. J50 Sample/Slab/Thin Section Description (rep litho sample taken 1.5 m abu), fresh surface colour; vw xlt yellowish orange (10YR 8/1), sedimentary structures; very vague planar bedding, composition; 5% micrite, 10% microspar, 5% f xyn spar, 75% f xyn dolomite (mode 40µm), is evenly distributed and consists of anhedral intergrown xtals, minor calcified dolomite occurs as microspar replacing dolomite along edges. 5% interxyn porosity. CL; very dull orange-red luminescent dolomite, calcite is non-luminescent. Rock Name: sl micritic/sl sparry microsparitic f xyn dolostone.

BASE OF UNIT 395.85 TOP OF UNIT 402.75 THICKNESS 6.90

UNIT J51. Rec covered interval.

BASE OF UNIT 402.75 TOP OF UNIT 403.95 THICKNESS 1.20

UNIT J52. Weathering Character prom unit (15 m wide) is traceable in buttress-like outcrops for kilometres along the coast. Colour WS-m brown w/ yellowish brown patches. FS-m brown. Basal Contact covered. Bedding Character planar bedded (some mottles). Bed Parting Thickness min 4 cm, max 50 cm, mode 30 cm. Composition ls. Fossils 2% ostracod valve frags. Misc well indurated. J52 Sample/Slab/Thin Section Description (rep litho sample taken 1.5 m abu), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; minor low-amplitude stylolites, small isolated dk pelmicrosparitic areas to 1 cm in size represent

undolomitized remnants of original litho, composition; 5% articulated ostracods to 2 mm in size, filled w/ pelmicrospar and spar, 10% ostracod frags. 15% peloids (composed of 10% micrite and 5% microspar). 5% microspar, 5% f xyn spar occurs between peloids and peloid aggregates, 50% f xyn dolomite (40 μ m mode), calcified dolomite is com as clear composite microspar replacing cores of dolomite rhombs. Most of the dolomite has microspar inclusions. 10% porosity (5% along stylolites and 5% between xtals), misc; minor subvertical fractures terminate at stylolites, areas below convex-up ostracod frags are not dolomitic. FLUOR; scalenohedral spar lines and coats ostracods (isopachous cement), spar filling ostracods is non-fluorescent. Rock Name: mottled ostracodal peloidal f xyn dolostone.
BASE OF UNIT 403.95 TOP OF UNIT 406.95 THICKNESS 3.00

UNIT J53. Weathering Character prom. Colour WS & FS-m brown. Basal Contact wavy abrupt (wavelength 3 m, amplitude 20 cm). Bedding Character planar lam. Bed/Lam Thickness mode 1.0 cm. Bed/Parting Thickness min 4 cm, max 50 cm, mode 10 cm. Composition ls w/ tr carb film. Sedimentary Structures planar lam. Fossils 2% ossicles, 3 mm wide 'tubes'. J53 Sample/Slab/Thin Section Description (rep litho sample taken 1 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low- and minor high-amplitude stylolites, mottles are elongate parallel to bedding, composition; 5% micrite and 20% microspar in irregularly-shaped and variously-sized stylolite-bounded mottles, 72% f xyn dolomite (40 μ m modal size), good examples of calcified dolomite in the form of clear composite microspar after dolomite rhombs. 3% porosity along stylolites and between xtals/gns. CL; a dull red luminescent dolomite. Except for bright orange-luminescent spar-filled veinlets, calcite is non-luminescent. Rock Name: mottled sl micritic/microsparitic f xyn dolostone.
BASE OF UNIT 406.95 TOP OF UNIT 408.65 THICKNESS 1.70

UNIT J54. Weathering Character prom outcrop as for previous unit. Colour WS-variable m grey w/ rusty brown mottles. FS-m brown. Basal Contact abrupt planar to sl wavy, 1 m wavelength. Bedding Character massive, fractured. Composition ls w/ <0.1 mm xtal size. Sedimentary Structures hummocky structures(?). Misc well indurated where not fractured.
BASE OF UNIT 408.65 TOP OF UNIT 409.55 THICKNESS 0.90

UNIT J55. Weathering Character prom outcrop as for previous unit. Colour WS & FS-buff. Basal Contact irregular hummocky (deformed). Bedding Character planar lam and locally convex-up and contorted stratification. Bed/Lam Thickness mode 1.0 cm. Bed Parting Thickness min 10 mm, max 30 mm, mode 15 mm. Composition dolostone, locally crackle breccia. Sedimentary Structures planar lam. Misc deformed, breccia veinlets run through unit. J55 Sample/Slab/Thin Section Description (rep litho sample taken 20 cm abu), fresh surface colour; breccia clasts are wk xlt yellowish orange (10YR 8/2) in a wk dk olive-brown (10YR 4/2) groundmass, composition; breccia clasts consist of porous vf-f xyn dolostone in which porosity is in the form of leached dolomite xtals, clast size min-5 mm, max 50 mm, mode 10 mm, 'matrix' consists of f-m xyn spar and chert, misc; numerous subvertical fractures terminate at stylolites, fractures and stylolites are partly filled w/ spar, in places spar has been dissolved to create porosity. CL; dolomite luminesces dull red, calcite is non-luminescent. Rock Name: vf to f xyn dolostone 'clast' f-m xyn spar/chert 'matrix' crackle breccia.
BASE OF UNIT 409.55 TOP OF UNIT 410.15 THICKNESS 0.60

UNIT J56. Weathering Character prom. Colour WS & FS-m brown. Basal Contact irregular, extends down into unit J55 to various levels. Composition breccia and in part bedded (deformed), 10% porosity, 10% 'matrix', 80% 'clasts', including dk grey ang chert (from chert nodules). Clast size-min 1 cm, max 10 cm, mode 2 cm. Clast orientation-random. Clast shape-ang to sbang. Sedimentary Structures vague planar bedding, in part contorted. J56 Sample/Slab/Thin Section Description (litho sample of bedded portion, one of breccia w/ chert clasts), fresh surface colour; wk xlt yellowish orange (10YR 8/2) clasts in a m olive-brown (10YR 5/3) groundmass, sedimentary structures; some broken chert nodules, mainly low-amplitude stylolites, however some are subvertical and separate crackle breccia

clasts, composition; 37% microspar, 20% spar fills and/or replaces mat'l along stylolites and fractures, 5% ang chert clasts to 25 mm in size, contains between 5 and 50% f xyn spar rhomb inclusions. 35% f xyn dolomite, very extensively calcified dolomite occurs in the form of f xyn spar after dolomite rhombs, in many cases the margins of the dolomite rhombs are preserved. 3% porosity along fractures and stylolites. Misc; subvertical fractures terminate at stylolites. Fractures and stylolites define the boundaries of crackle breccia 'clasts' which are further distinguished where spar fills or replaces mat'l along stylolites and fractures. CL; dolomite luminesces dull red, calcite is non-luminescent. Rock Name: sparry/dolomitic microsparite crackle breccia.

BASE OF UNIT 410.15 TOP OF UNIT 411.60 THICKNESS 1.45

UNIT J57. Rec covered interval.

BASE OF UNIT 411.60 TOP OF UNIT 412.95 THICKNESS 1.35

UNIT J58. Weathering Character prom. Colour WS & FS-lt buff. Basal Contact covered. Bedding Character superimposed convex-up structures on various scales to 8 cm across and 1 cm high. Bed/Parting Thickness min 2 cm, max 50 cm, mode 20 cm. Composition dolomitic ls. Misc well indurated. J58 Sample/Slab/Thin Section Description (rep litho sample taken 2.0 m abu), fresh surface colour; wk xlt yellowish orange (10YR 7/2), sedimentary structures; convex-up structures (wavelength 12 cm, amplitude 3 cm), low-amplitude stylolites, composition; 15% spar between xtals and along fractures, 70% f xyn dolomite (50µm mode), minor calcified dolomite. 15% interxyn porosity due to corroded dolomite, misc; minor subvertical spar-filled fractures terminate at stylolites. CL; dolomite luminesces dull red, calcite is non-luminescent. Rock Name: sparry (f xyn) f xyn dolostone.

BASE OF UNIT 412.95 TOP OF UNIT 416.10 THICKNESS 3.15

UNIT J59. Weathering Character prom outcrop as for previous unit. Colour WS & FS-buff. Basal Contact wavy (wavelength 2.0 m, amplitude 30 cm). Bedding Character wavy structures. Bed Parting Thickness min 2 cm, max 30 cm, mode 15 cm. Composition ls w/ <0.1 mm xtal size, fenestral? porosity, tr chert nodules. Sedimentary Structures minor high-amplitude stylolites, hummocky structures (wavelength 2 m, amplitude 0.5 m). Misc well indurated.

BASE OF UNIT 416.10 TOP OF UNIT 420.40 THICKNESS 4.30

UNIT J60. Weathering Character prom 1-2 m wide outcrop. Colour WS & FS-m brown, mottled. Basal Contact abrupt planar. Bedding Character mottled. Composition ls w/ chert nodules, xtal size <0.1 mm. Sedimentary Structures mottles. Misc well indurated.

BASE OF UNIT 420.40 TOP OF UNIT 421.15 THICKNESS 0.75

UNIT J61. Weathering Character prom. Colour WS & FS-buff. Basal Contact abrupt. Bedding Character vague planar bedding. Bed Parting Thickness mode 15 cm. Composition dolostone w/ 2 mm xtal size. Sedimentary Structures planar bedding.

BASE OF UNIT 421.15 TOP OF UNIT 422.00 THICKNESS 0.85

UNIT J62. Prom mottled ls.

BASE OF UNIT 422.00 TOP OF UNIT 422.65 THICKNESS 0.65

UNIT J63. Prom buff dolostone.

BASE OF UNIT 422.65 TOP OF UNIT 423.55 THICKNESS 0.90

UNIT J64. Prom mottled ls as for Je60.

BASE OF UNIT 423.55 TOP OF UNIT 424.55 THICKNESS 1.00

UNIT J65. Prom buff ls, the basal 30 cm contains hummocky structures.

BASE OF UNIT 424.55 TOP OF UNIT 425.90 THICKNESS 1.35

UNIT J66. Weathering Character prom. Colour WS-buff, FS-m brown. Basal Contact indet. Composition rubble breccia, 80% 'clasts', 10% 'matrix', 'clast' size min 5 mm, max 10 cm, mode 3 cm, orientation random, shape is ang to shang, clast composition is ls (<0.1 mm xtal size). Misc crumbly and inaccessible.
BASE OF UNIT 425.90 TOP OF UNIT 427.25 THICKNESS 1.35

UNIT J66a. Prom inaccessible brown ls.
BASE OF UNIT 427.25 TOP OF UNIT 427.85 THICKNESS 0.50

UNIT J67. Rec poor exposure, m brown calc dolostone to dolomitic ls. J67 Sample/Slab/Thin Section Description (rep litho sample taken at top of unit), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; tr plicated brachs, 2% dolomitic sponge spicules, 70% peloids (composed of 20% micrite and 50% microspar), 10% microspar between peloids, 5% subvertical spar-filled fractures, spar is f-very c xyn, 5% spar between peloids and peloid aggregates, 3% vf-f xyn evenly distributed dolomite, 5% porosity along stylolites and between xtals/gns, misc; some of the small subvertical fractures terminate at stylolites, there are also a few spar-filled fractures subparallel to bedding. CL; bright orange-luminescent complexly-zoned spar 'matrix', spar lining clasts is non-luminescent. Calcite of the 'clasts' is non-luminescent. FLUOR; fracture-filling spar is vaguely zoned. Rock Name: sparry sl dolomitic pelmicrosparite.
BASE OF UNIT 427.85 TOP OF UNIT 429.60 THICKNESS 1.75

UNIT J68. Semi-prom buff calc dolostone to ls w/ hummocky structures at top of unit.
BASE OF UNIT 429.60 TOP OF UNIT 433.05 THICKNESS 3.45

UNIT J69. Rec covered interval.
BASE OF UNIT 433.05 TOP OF UNIT 434.30 THICKNESS 1.25

UNIT J70. Weathering Character prom, outcrop traceable for kilometres along coastline, forms prom ledge. Unit weathers buff 12.5 m abu. Colour WS-m brownish grey, FS-m brown. Basal Contact abrupt planar. Bedding Character vaguely bedded, in part mottled, locally brecciated. Bed Parting Thickness min 2 cm, max 3 m, mode 1.5 m. Composition ls w/ 0.3-0.4 mm xtal size, locally brecciated, tr chert nodules to 15 cm long x 10 cm thick, dk grey, rd, elongate parallel to bedding, vugs 1-2 mm in size. Sedimentary Structures vague bedding, stylolites, hummocky structures 10.5 to 12.5 m abu. Fossils tr plicated brachs approx 0.5 cm wide, up to 1% ostracods (1 cm in size and 0.5 mm thick), poorly preserved 2 cm-wide colonial coral 3 m abu. Misc locally brecciated and fractured, particularly at base. Breccia veinlets run through entire outcrop. Sample J70 taken for conodonts. J70a Sample/Slab Description (rep litho sample taken at base), fresh surface colour; clasts are wk m olive-brown (10YR 5/2) and vwk xlt yellowish orange (10YR 8/1), sedimentary structures; crackle breccia, composition; ostracods are coated w/ a radially-oriented spar xtal cement rim 0.15 mm thick, 50% articulated ostracods (modal size 0.7 mm), many filled w/ spar. 15% f-c xyn spar fills subvertical fractures, 20% f-c xyn spar occurs between ostracods. 15% subvertical fracture porosity. Rock Name: coated gn ostracodal biosparite crackle breccia.
J70b Sample/Slab/Thin Section Description (rep litho sample of bedded portion taken 1.5 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, 10% vugs to 3 mm in size, 1% porosity along stylolites, composition; 5% intraclasts to 7 mm in size, 30% ostracods (mode 1 mm) filled w/ spar, 10% of these ostracods are coated w/ a rim of radially disposed elongate spar xtals, tr brachs, 25% peloids (50µm mode). 10% microspar, 19% f-c xyn spar, tr dispersed f xyn dolomite. 10% porosity in vugs/fractures and between xtals/gns. CL; 20% orange-luminescent overgrowths on spar filling vugs, calcite is non-luminescent. FLUOR; fluorescent scalenohedral spar rims peloids (isopachous cement), spar between peloids is non-fluorescent. Rock Name: sl intraclastic/coated gn/ ostracodal/microsparitic biopelsparite.
BASE OF UNIT 434.30 TOP OF UNIT 448.00 THICKNESS 13.70

The base of J71 is taken as the base of the upper member of the Cape Crauford Formation.

UNIT J71. Weathering Character prom 1-2 m wide outcrop. Colour WS & FS-lt buff. Basal Contact wavy abrupt (5 cm wavelength, 1 cm amplitude). Bedding Character wavy structures. Bed Parting Thickness mode 10 cm. Composition ls w/ 0.2 mm xtal size. Sedimentary Structures high-amplitude stylolites. J71 Sample/Slab/Thin Section Description (rep litho sample taken at top of unit, contains a vein of breccia derived from the overlying unit), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; pervasive high amplitude (to 6 mm) stylolites in locally brecciated 3 cm wide subvertical breccia vein, low-amplitude stylolites in unbrecciated rock. Some low-amplitude stylolites in unbrecciated rock may be traced laterally into high-amplitude stylolites in the breccia vein. Residue along stylolites is a limonitic yellowish orange. Locally brecciated w/ some clasts partly dissolved along solution-widened fractures, composition; f-m xyn spar (35 μ m mode), tr malachite in breccia, some carb rhombs replaced by monoxyn quartz. 10% porosity along fractures and stylolites, 5% between xtals, misc; in local breccia vein subvertical fractures traverse stylolites, breccia is composed of microsparite/ sparite 'clasts', a few are composed of monoxyn quartz or spherulitic chalcedony, clast size min-2 mm, max 2 cm, mode 8 mm, 'matrix' is microsparite/f xyn sparite. CL; calcite luminesces a very dull orange-red except for bright orange-luminescent spar overgrowths on pore-lining spar. FLUOR; 5% fluorescent-zoned pore-filling spar. Rock Name: locally brecciated microsparitic f-m xyn sparite.
BASE OF UNIT 448.00 TOP OF UNIT 448.30 THICKNESS 0.30

UNIT J72. Weathering Character prom 7 m wide outcrop. Colour WS & FS-lt buff. Basal Contact wavy, trans over 10 cm. Composition ls breccia, 60% clasts, 25% 'matrix', 15% porosity mainly as clast moulds, clast size-min 2 mm, max 10 cm, mode 1.5 cm, inverse size-grading of breccia clasts, crackle breccia at base is trans to rubble breccia 10 cm abu. At base clast size mode is 4 mm, 1 m abu mode is up to 10 cm, random clast orientation, ang to sbdrd clasts w/ sbdrd large clasts, tr chert clasts. Sedimentary Structures high-amplitude (to 20 mm) columnar stylolites throughout unit. Misc lams in some of the clasts. J72 Sample/Slab/Thin Section Description (rep litho sample taken at base of unit), fresh surface colour; clasts are wk m olive-brown (10YR 5/2) and xlt yellowish-orange (10YR 8/3), sedimentary structures; pervasive stylolites w/ amplitudes to 20 mm, some stylolites bifurcate, composition; breccia clasts are composed of pelmicrosparite or microsparite to f xyn sparite, 3% ang chert clasts (min 2 mm, max 30 mm, mode 8 mm), 'matrix' consists of f xyn sparite, misc; clasts are extensively fractured, some subvertical fractures terminate at stylolites. CL; non-luminescent except for orange-luminescent zoned overgrowths on clear spar lining 'clasts'. FLUOR; irregularly-shaped fluorescent patchy areas. Rock Name: pelmicrosparite/microsparite to f xyn sparite 'clast' f xyn sparite 'matrix' mosaic to rubble breccia.
BASE OF UNIT 448.30 TOP OF UNIT 450.15 THICKNESS 1.85

UNIT J73. Rec covered interval.

BASE OF UNIT 450.15 TOP OF UNIT 451.15 THICKNESS 1.00

UNIT J74. Weathering Character prom unit is traceable for kilometres. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character hummocky structures, locally brecciated. Bed Parting Thickness min 5 mm, max 20 cm, mode 10 cm. Composition ls w/ chert nodules (10 cm long by 7 cm thick), elongate parallel to bedding, in part breccia. Sedimentary Structures high-amplitude stylolites throughout, bedding deflected by chert nodules, also hummocky structures, locally brecciated and fractured. J74 Sample/Slab/Thin Section Description (rep litho sample taken 1.5 m abu), fresh surface colour; lt olive brown (10YR 6/3), sedimentary structures; low-amplitude stylolites w/ amplitudes to 0.9 mm, local breccia, extensively fractured, extensive dissolution (vugs to 1 mm), composition; crackle breccia, 15% microspar pseudomorphs after gypsum xtals to 1 mm in size (some w/ swallowtail twins), pseudomorphs concentrated along stylolites where they are partly dissolved/truncated, 20% spar fills subvertical fractures, 5% aphano-f xyn dolomite, 5%

porosity along fractures and stylolites, 55% breccia clasts (composed of microsparite) w/ a 5 mm modal size, misc; extensive subvertical fractures some of which terminate at stylolites, some fractures are microfaults along which stylolites are offset. CL; non-luminescent except for multi-fold zoned orange-luminescent calcite overgrowths on spar lining vugs. Spar filling vugs may be bright orange-luminescent. Rock Name: microsparite 'clast'/sparite 'matrix' crackle breccia.

BASE OF UNIT 451.15 TOP OF UNIT 454.75 THICKNESS 3.60

UNIT J75. Rec covered interval.

BASE OF UNIT 454.75 TOP OF UNIT 456.50 THICKNESS 1.75

UNIT J76. Weathering Character prom unit is traceable for kilometres. Colour WS-m brownish-grey w/ rusty brown mottles. FS-m brownish-grey. Basal Contact covered. Bedding Character planar bedded. Bed Parting Thickness min 1.0 cm, max 50 cm, mode 20 cm. Composition ls w/ <0.1 mm xtal size (micrite?), 5% fracture porosity, tr chert nodules 20 x 2 cm (elongate parallel to bedding). Sedimentary Structures planar bedding. Misc in part fractured. J76 Sample/Slab/Thin Section Description (rep litho sample taken 1 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; sl fractured, low-amplitude stylolites, minor dendrites, composition; 94% microspar, 3% vf xyn dolomite, 3% fracture porosity, misc; sl fractured, subvertical fractures terminate at stylolites. CL; non-luminescent except for orange-luminescent zoned overgrowths on spar lining fractures. Rock Name: microsparite. Sample Je76a conodont sample taken.

BASE OF UNIT 456.50 TOP OF UNIT 459.00 THICKNESS 2.50

UNIT J77. Rec covered interval.

BASE OF UNIT 459.00 TOP OF UNIT 461.75 THICKNESS 2.75

UNIT J78. Weathering Character prom, unit is traceable laterally for kilometres. Colour WS & FS-mottled buff, rusty bedding planes. Basal Contact covered. Bedding Character mottled. Bed Parting Thickness min 5 cm, max 2.0 m, mode 30 cm. Composition f xyn dolostone, 1% grey chert nodules w/ white rims. Sedimentary Structures 2 cm-sized mottles, brown ls mottles weather out. Fossils dolomitized poorly preserved solitary corals (2 cm in size), brachs in scree, 1-2% ossicles 13 m abu, 1 cm-sized at a locality 16 m abu. Misc well indurated. J78 Sample/Slab/Thin Section Description (rep litho sample taken 3.75 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites (accentuated by yellowish orange residue), mottles, composition; 10% articulated ostracods to 5 mm, 5% ostracod frags, 2% ossicles (some w/ dolomite overgrowths), 5% spar fills vugs, 5% chalcedony occurs along one stylolite, tr c xyn hematite in thin section, 85% f xyn dolomite as anhedral intergrown xtals, inclusion-rich cores and clear rims. 10% porosity along stylolites and between xtals/gns, misc; subvertical dolospar-filled fractures com terminate at stylolites. CL; a uniform moderate orange-red luminescent dolomite except for zoned orange-luminescent overgrowths on limpid dolomite lining vugs. FLUOR; clear zoned spar in patchy areas. Rock Name: ostracodal sl sparry/chalcedonic f-m xyn dolostone.

BASE OF UNIT 461.75 TOP OF UNIT 487.25 THICKNESS 25.50

UNIT J79. Rec covered interval.

BASE OF UNIT 487.25 TOP OF UNIT 500.00 THICKNESS 12.75

M. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION K, MEASURED IN 1983.

Locality: Section K, Stanley Point, 2,560 m south of Lancaster Sound.

Latitude: 73°48'10"N.

Longitude: 85°33'00"W.

Section K is entirely in member B of the Baillarge Formation.

The top of unit K2 is taken as stratigraphically equivalent to the top of unit I2.

UNIT K1. Rec covered interval. Measured along stream which flows out of glacier 2 km south of Lancaster Sound and due south of base camp.

BASE OF UNIT 0.00 TOP OF UNIT 52.00 THICKNESS 52.00

UNIT K2. Weathering Character prom, outcrop approx 5 m wide in canyon. Colour WS & FS-wispy to mottled m brown. Basal Contact covered. Bedding Character wispy to mottled. Bed Parting Thickness min 30 cm, max 1.0 m, mode 0.5 m. Composition ls. Sedimentary Structures wispy and mottled bedding, high-amplitude stylolites. Fossils 1% ossicles, tr <1cm wide disarticulated brachs, tr solitary coral, in situ 2 cm wide colonial coral 4.5 m abu, minor thick-shelled brachs as found in section I 13.0 m abu. Misc bitumenous odour, well developed subvertical joint pattern. Ka2 Sample/Slab Description (of colonial coral), fresh surface colour; wk dk olive-brown (10YR 4/2) and minor vlt yellowish orange (10YR 7/3), sedimentary structures; minor high-amplitude stylolites, irregularly-shaped mottles to 2 cm in size are elongate parallel to bedding, composition; 5% articulated ostracods, 10% ostracod frags, tr stick bryozoans, tr favositid corals. 58% microspar, 5% spar, 2% white chert, 15% f xyn dolomite is concentrated in mottles, 5% porosity along stylolites and fractures, misc; subvertical spar-filled fractures terminate at stylolites. Rock Name: mottled sl sparry/dolomitic ostracodal biomicrosparite. Ka2a Sample/Slab Description (taken 4.5 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2) and minor wk vlt yellowish orange (10YR 7/2), sedimentary structures; wispy dolomitic mottles, low-amplitude stylolites, composition; 5% ostracod frags, 5% articulated pentamerid brachs 50 mm in size w/ 5 mm thick valves. 65% microspar, 5% spar, 20% f xyn dolomite (30µm mode) is mainly concentrated in dolomitic mottles, 5% porosity along stylolites and between xtals in the dolomitic mottles. Rock Name: mottled sl sparry/dolomitic biomicrosparite.

BASE OF UNIT 52.00 TOP OF UNIT 68.25 THICKNESS 16.25

UNIT K3. Rec covered interval (now approx 100-150 m upstream from start of section).

BASE OF UNIT 68.25 TOP OF UNIT 74.95 THICKNESS 6.70

UNIT K4. Same as Ka2-mottled, horizontal 'tubes' on bedding plane surfaces, 7.5 m abu it is less mottled, 8.0 m abu there is a 7 cm wide in-place stromatoporoid, 9.0 m abu there is a 5 cm-wide colonial coral, 9.5 m abu-solitary coral. Kb4 Sample/Slab/Thin Section Description (taken 9.5 m abu), fresh surface colour; lt olive-brown (10YR 6/3), sedimentary structures; low-amplitude stylolites, poorly-defined wispy dolomitic mottles, composition; 2% articulated ostracods to 2.5 mm in size are filled w/ spar, 20% brach frags, 2% ossicles, tr *Catenipora* frags, 3% solitary corals (to 6 mm in size), one favositid coral (1%) (50 mm by 7 mm thick). 15% peloids (composed of microspar), 20% spar, 32% f xyn dolomite is evenly distributed (sl concentrated in vague irregular wispy areas), many dolomite rhombs are lath-shaped, 5% porosity along stylolites and between xtals/gns. Minor subvertical fractures terminate at stylolites. CL; 60% dull orange-red and rare blue-luminescent fluorite after dolomite, calcite (including fossils) is non-luminescent. Rock Name: peloidal/sparry/fossiliferous f xyn dolostone.

BASE OF UNIT 74.95 TOP OF UNIT 87.55 THICKNESS 12.60

UNIT K5. Weathering Character prom 50 m wide outcrop. Composition same as previous unit except is calc dolostone. Unit K5 is a ls 10 m abu, calc dolostone 13 m abu, ls 14 and 25 m abu. Fossils poorly preserved solitary corals, colonial corals 7.5 m abu, brachs (1 cm in size). Smooth-shelled brachs (2-3%) and colonial corals to 10 cm wide 9 m abu. Large gastropod in scree 13.45 m abu. Kb5 Sample/Slab/Thin Section Description (sample of brachs and corals 7.5 m abu), fresh surface colour; mottled vlt orangy yellow (2.5Y 7/3) and wk dk brownish olive (2.5Y 4/2), sedimentary structures; 30% irregularly-shaped dolomitic mottles, low-amplitude stylolites, composition; 5% favositid corals to 30 mm in size, tr ostracods to 1.5 mm, 10% disarticulated brach valves to 2 mm thick, tr solitary coral to 5 mm in size, 2%

stromatoporoids to 30 mm in size, 33% peloids (composed of microspar), 15% spar, 20% f xyn dolomite is concentrated in irregularly-shaped mottles, most of the dolomite rhombs are lath-shaped, tr chalcedony, 10% porosity between xtals/gns, especially in dolomitic mottles where calcified dolomite has been preferentially leached. CL; dolomite luminesces a very dull orange-red although there is rare blue-luminescent fluorite after dolomite, calcite is non-luminescent except for complex-zoned spar filling pores. Rock Name: dolomitic biopelsparite. Kb5a Scree Sample Description (contains a gastropod 13.45 m abu), fresh surface colour; wk vdk olive-brown (10YR 3/2), gastropod curves slightly, has a max width of 1 cm and a length of 7 cm.

BASE OF UNIT 87.55 TOP OF UNIT 116.50 THICKNESS 28.95

UNIT K6. Rec covered interval. Base of next unit is approx equivalent to the base of Jb5, the first major ledge former w/ 2 thin capping beds. This unit dips to the east approx 20 m across the valley.

BASE OF UNIT 116.50 TOP OF UNIT 222.50 THICKNESS 106.00

N. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION L, MEASURED IN 1984.

Locality: 26.5 km SW of Cape Crauford on coast.

Latitude: 73°33'30"N.

Longitude: 85°20'30"W.

The base of unit L2 is taken as the contact between members A and B of the Baillarge Formation.

The base of L1 is taken as equivalent to section P at 81 m.

UNIT L1. Weathering Character rec covered interval. Basal Contact sealevel is assigned 0 m in this section.

BASE OF UNIT 0.00 TOP OF UNIT 3.00 THICKNESS 3.00

UNIT L2. This unit was described approx 100 m west of the coast. Weathering Character prom cliff-former. Colour WS and FS-lt gy w/ yellow wisps. Basal Contact covered. Bedding Character wispy. Bed Thickness 0.5 m. Composition microsparitic ls w/ very low porosity, 5-10% fossils. Sedimentary Structures irregular mottles. Fossils 5-10%, one orthoconic nautiloid (sampled) is oriented approx 320° on a bedding plane, large orthocones (0.5 m long) 10.6 m abu, 3% disarticulated brachs (0.5 to 1 cm modal size), solitary coral (2 cm in size) 12 m abu. Misc probable clay content defines bedding. L2 Sample/Slab Description (taken 3.2 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; 10% small irregularly-shaped dolomitic mottles, composition; 20% dasyclad algae are cylinder-shaped w/ walls perforated by 'tubes', are up to 2 mm in diameter and have lengths to 3.5 mm though some have a more complicated morphology, tr gastropods, 3% ossicles, 5% brach frags, tr spar-filled ostracods to 2.5 mm in size, tr dasyclads(?) have a 5-walled star-shaped axial canal. 40% microspar, 5% spar, 1% pyrite along stylolites and in part replacing dasyclad walls, 2% residue along stylolites, 15% f xyn dolomite (25µm mode), 10% interxyn porosity. Rock Name: sl sparry/dolomitic dasyclad-rich biomicrosparite. Sample L2a taken for conodonts. L2b Sample/Slab/Thin Section Description fresh surface colour; vwk m olive-brown (10YR 5/1), sedimentary structures; low-amplitude stylolites, composition; 5% dasyclad algae (some are in a chain), 5% undifferentiated bioclastic mat'l, 5% ostracod frags. 15% micrite, 30% microspar, 15% m-c xyn spar fills concave-up brach valves, 20% f xyn dolomite occurs alongside stylolites, some dasyclads have been preferentially dolomitized. 5% porosity along stylolites and between xtals/gns in dolomitic mottles. CL; pervasive bright orange-luminescent calcite. Rock Name: micritic/sparry/dolomitic biomicrosparite. L2c Sample/Slab/Thin Section Description (taken 10 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 15% dasyclads (several types)

and dasyclad frags, some in part replaced by f xyn spar, 5% ossicles, tr gastropods, tr ostracods to 2 mm in size, 5% ostracod frags, tr solitary corals, 1% plicated brach valve frags. 20% micrite, 36% microspar, 3% spar fills articulated ostracods, 1% pyrite is concentrated along stylolites and replaces some fossil frags, 15% aphano-f xyn dolomite is concentrated beside stylolites but is evenly distributed between stylolites, also fills microporosity in ossicles. 2% interxyn porosity near stylolites. CL; pervasive bright orange-luminescence except for a few fossil frags. Rock Name: mottled micritic/dolomitic dasyclad-rich biomicrosparite. L2d Sample/Slab Description (taken 15 m abu), fresh surface colour; wk m olive-brown (10YR 5/1), composition; 30% *Syringopora* skeleton, tr stick bryozoa, 1% ossicles, 66% microspar between corallites, 30% f xyn spar fills corallites, 3% f xyn pyrite, partly replaces skeleton. Rock Name: *Syringopora* w/ a microsparite 'matrix'.
BASE OF UNIT 3.00 TOP OF UNIT 18.30 THICKNESS 15.30

UNIT L3. Weathering Character prom, partly covered from 0.7 to 5.0 m abu, travelled 50 m downstream. Colour WS & FS-as for L2, mottles weather a rust colour. Basal Contact planar abrupt. Bedding Character mottled. Bed Thickness massive to thick bedded. Composition ls. Sedimentary Structures 10% wispy mottles (lighter in colour), minor high-amplitude stylolites. Fossils 2-3% brachs and ossicles. L3 Sample/Slab/Thin Section Description (taken 0.7 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, minor high-amplitude stylolites accentuated w/ residue to 50µm thick, irregularly-shaped dolomitic mottles (about 1 cm in size), mottles are bounded by stylolites that bifurcate laterally, some are at right angles to bedding, composition; 10% ossicles (some pentagonally-sided), tr dasyclads, 10% ostracod frags, minor articulated ostracods to 1.5 mm, tr brachs, bryozoans and gastropods (to 0.5 mm in size). 15% micrite, 31% microspar, 10% spar, 1% disseminated pyrite, 15% vf-f xyn dolomite is concentrated in mottles, 5% evenly distributed dolomite. Calcified dolomite is com as composite microspar replacing dolomite rhomb xtal cores and especially as microspar rims around dolomite cores. 3% porosity along and near stylolites. Misc tr subvertical fractures terminate at stylolites, some of which have residues similar to stylolites. CL; pervasive bright orange luminescence except for fossils. Rock Name: dolomitic mottled sparry/micritic biomicrosparite. Sample L3a taken for conodonts.

BASE OF UNIT 18.30 TOP OF UNIT 28.00 THICKNESS 9.70

UNIT L4. Weathering Character rec covered interval.

BASE OF UNIT 28.00 TOP OF UNIT 30.50 THICKNESS 2.50

UNIT L5. Weathering Character prom. Colour WS and FS-as for L3, sl greenish (malachite?). Basal Contact covered. Bedding Character mottled. Composition mottled ls as for L3, uniform throughout, tr malachite(?). Sedimentary Structures mottles, faint subvertical slickensides 38.0 m abu. Fossils none. L5 Sample/Slab/Thin Section Description (taken 0.6 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; 10% dolomitic wisps/mottles w/ low-amplitude stylolites passing through them, composition; 5% dasyclad algae, 2% ossicles, 10% ostracod frags, tr articulated ostracods to 1.5 mm in size, many of the fossils have been dolomitized. 20% micrite, 23% microspar, 10% spar, tr pyrite, 10% f xyn dolomite (25µm mode) is concentrated in wispy-shaped mottles, 15% dolomite is evenly distributed between mottles, 5% porosity along stylolites and between xtals in dolomitic mottles, misc; minor subvertical fractures terminate at stylolites. CL; bright orange-luminescence except for fossil frags. Rock Name: mottled dolomitic/sparry/micritic biomicrosparite. L5a Sample/Slab Description (taken 4.5 m abu w/ malachite(?) stain), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites and irregularly-shaped dolomitic mottles to 2 cm in size, composition; 2% dasyclad algae, 10% ossicles. 72% microspar, 1% pyrite, 10% dolomite is concentrated in mottles and between subvertical fractures, in places mottle boundaries are subvertical fractures, 5% porosity along stylolites and in dolomitic mottles, misc; subvertical fractures terminate at stylolites. Rock Name: mottled dolomitic ossicle-rich biomicrosparite. L5b Sample/Slab Description (taken 19.0 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk

vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites are accentuated by 25 μ m thick residue, stylolites com form upper or lower boundary of dolomitic mottles, composition; 3% dasyclad algae, 10% ossicles (some pentagonally-sided), tr gastropods, 57% microspar, tr spar along stylolites, tr pyrite, 25% f xyn dolomite (35 μ m mode), 5% porosity along stylolites/fractures and between xtals in dolomitic mottles, misc; subvertical fractures com terminate at stylolites. Rock Name: mottled dolomitic ossicle-rich biomicrosparite. Sample L5c taken from 19.0 to 22.5 m abu. L5d Sample/Slab/Thin Section Description (taken 27 m abu), fresh surface colour; wk dk olive brown (10YR 4/2) and wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites are accentuated by thin black residue, irregularly-shaped and variously oriented cm-sized dolomitic mottles are developed around stylolites and subvertical fractures, composition; 10% dasyclad algae, tr gastropods to 1 mm in size, 3% ossicles, tr echinoderm stems to 3.5 mm long, 1% articulated ostracods to 1 mm in size, tr pyrite, 5% ostracod frags, 15% micrite, 41% microspar, 20% f xyn dolomite (50 μ m mode) is concentrated in mottles which consist of sparry f xyn dolomite, 5% vf-f xyn dolomite is evenly distributed, the boundaries of the dolomite rhombs are com replaced by microspar, porosity occurs along stylolites/fractures (5%) and between xtals (5%) in the dolomitic mottles, misc; minor subvertical fractures terminate at stylolites. CL; bright orange luminescence except for tr fossil frags, dolomite luminesces red. Rock Name: mottled dolomitic/micritic biomicrosparite. L5e Sample/Slab Description (rep litho sample taken 29.5 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) spar mottles, sedimentary structures; low-amplitude stylolites are accentuated by limonite-coloured residue, 15% mottles (to 2 cm in size) are composed of spar (probably calcified dolomite), not dolomite, composition; tr gastropods, 5% dasyclad algae, 10% ossicles, 10% ostracod frags, tr articulated ostracods (<1 mm in size), 68% microspar, 2% spar fills fractures, 2% dolomite, 3% porosity along stylolites/fractures, misc; subvertical fractures terminate either at mottles or stylolites. Rock Name: spar (calcified dolomite?)-mottled biomicrosparite. L5f Sample/Slab Description (taken 36.5 m abu), fresh surface colour; wk m olive brown (10YR 5/2) ls w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites, cm-sized irregularly-shaped mottles, composition; tr gastropod frags (1 is high-spined and 2 mm long), 1% articulated ostracods to 2 mm in size, 5% ostracod frags, 3% dasyclad algae, 51% microspar, 25% f xyn dolomite (30 μ m mode) is concentrated in mottles, 15% porosity between xtals especially in dolomitic mottles, misc; subvertical fractures terminate at stylolites. Rock Name: mottled dolomitic fossiliferous microsparite. L5g Sample/Slab/Thin Section Description (taken 39.4 m abu), fresh surface colour; wk m olive-brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites, composition; 1% dasyclad algae, 5% ossicles, 49% microspar, 30% f xyn dolomite (30 μ m mode) (concentrated in mottles), 15% interxyn porosity in mottles. Rock Name: mottled dolomitic ossicle-bearing microsparite. BASE OF UNIT 30.50 TOP OF UNIT 72.25 THICKNESS 41.75

UNIT L6. Weathering Character rec, covered. Misc moved from outcrop along creek to Admiralty Inlet coastal cliffs.

BASE OF UNIT 72.25 TOP OF UNIT 76.10 THICKNESS 3.85

UNIT L7. Weathering Character prom, complete exposure except for partial cover between 35.9 & 40.2 m abu. Mottles weather out preferentially. Colour WS-lt grey w/ buff and rust mottles. FS-m grey w/ lt grey and buff mottles. Basal Contact covered. Bedding Character mottles are elongate subparallel to bedding, mainly massive beds (thicker than 4 m). Bed/Lam Thickness min 0.8 m, max 4.0 m. Composition ls w/ approx 30% mottles. Fossils 1-3% ossicles w/ base at 0.9 m abu, 2-5 mm diameter, small 5 mm-sized solitary corals, echinoderm stems (to 1 cm long). Favositid coral 41.5 m abu, orthocone w/ 7 cm diameter 66.9 m abu, large spar xtals (to 4 mm). Orthocone 112.9 m abu, oriented approx 45° on a bedding plane. Sedimentary Structures tr high-amplitude stylolites 45.7 m abu. Misc subvertical joints w/ subvertical slickensides on some joints. Joints are lined w/ white dolomite(?). From base of unit to 23.9 or more abu the rock is remarkably homogeneous. Section L above 38.9 m abu

was continued approx 75 m upstream, a small plateau at 123.4 m abu. L7 Sample/Slab/Thin Section Description (rep litho sample 1.4 m abu), fresh surface colour; mottled olive brown (10YR 5/2) and wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, dolomitic mottles are bounded by stylolites, composition; 5% ossicles, 10% undifferentiated shell frags, 25% dasyclad algae of various types to 2 mm in size, tr ostracods to 1 mm, 10% micrite, 20% microspar, 5% spar, tr pyrite, 15% vf xyn dolomite is concentrated in mottles, porosity is distributed as 5% along stylolites and 5% between xtals, misc; subvertical fractures terminate at stylolites. Rock Name: mottled dolomitic/micritic/sl sparry dasyclad-rich biomicrosparite. CL; bright orange-luminescent calcite, dolomite is non-luminescent. Sample L7a taken for conodonts (0 to 22.9 m abu). L7b Sample/Slab Description (taken 3.4 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites, irregularly-shaped dolomitic mottles are elongate subparallel to bedding, composition; 5% ossicles some of which are pentagonally-sided, 10% dasyclad algae, 10% ostracod frags, 1% articulated ostracods to 1 mm in size, tr gastropods to 0.5 mm in size. 50% microspar, 9% f xyn dolomite (30 μ m mode) is concentrated in mottles, 5% dolomite is evenly distributed between mottles, 10% interxyn porosity in mottles and along stylolites/fractures, misc; subvertical fractures terminate at stylolites. Rock Name: mottled dolomitic biomicrosparite. L7c Sample/Slab Description (taken 9.9 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites and 25% dolomitic mottles, composition; 5% ossicles, 5% ostracod frags, tr articulated ostracods to 1 mm in size, 3% dasyclad algae, tr gastropods to 1 mm in size. 47% microspar, 25% f xyn dolomite (40 μ m mode) is concentrated in dolomitic mottles, 5% evenly distributed f xyn dolomite, 10% porosity along stylolites/fractures and between xtals in dolomitic mottles. Rock Name: mottled dolomitic biomicrosparite. L7d Sample/Slab/Thin Section Description (taken 19.6 m abu), wk m olive-brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites and irregularly-shaped mottles are subparallel to bedding, stylolites pass through the middle of the mottles, composition; 1% gastropods to 1.5 mm in size, 5% ossicles (not dolomitized in the dolomitic mottles), 15% dasyclad algae, 10% ostracod frags, 1% articulated ostracods to 1 mm in size. 20% micrite, 7% microspar, 1% f xyn spar fills ostracods, 21% f xyn dolomite (40 μ m mode) is concentrated in mottles, 5% f xyn dolomite is evenly distributed between mottles, 15% porosity along stylolites and between xtals in dolomitic mottles, misc; subvertical fractures terminate at stylolites. CL; pervasive bright orange-luminescent calcite, dolomite luminesces bright red. Rock Name: mottled dolomitic/sl microsparitic dasyclad-rich biomicrite. L7e Sample/Slab Description (taken 41.5 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; 5% dolomitic mottles partly replace coral, composition; 100% favositid coral, corallites are hexagonal and 1 mm wide, f-m xyn spar fills corallites, 5% f xyn dolomite (30 μ m mode). Rock Name: mottled sl dolomitic favositid coral. L7f Sample/Slab/Thin Section Description (taken 45.7 m abu), fresh surface colour; wk m olive brown (10YR 5/2) and vlt yellowish orange (10YR 7/3) spar (calcified dolomite) mottles, sedimentary structures; low-amplitude stylolites, tr high-amplitude stylolites, irregularly-shaped cm-sized spar mottles are elongate subparallel to bedding, composition; 5% articulated ostracods to 2 mm in size, 5% ostracod frags, tr high-spined gastropods to 2 mm in size, 15% dasyclad algae, tr solitary corals to 1.5 mm in size, 25% peloids (composed of microspar). 15% micrite, 20% microspar, 10% f xyn spar fills subvertical fractures, articulated ostracods and replaces original dolomite in mottles, 2% f xyn dolomite (mottles are spar and probably calcified dolomite), 3% porosity along fractures and stylolites, misc; minor subvertical fractures terminate at mottles. CL; pervasive orange-luminescent calcite, dolomite luminesces a brighter orange. Rock Name: mottled sparry (calcified dolomite) micritic dasyclad-rich biopelmicrosparite. L7g Sample/Slab Description (taken 64.9 m abu), wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites, 15% cm-sized irregularly-shaped dolomitic mottles, composition; 5% ossicles (some pentagonally-sided), 5% dasyclad algae, 5% ostracod frags, tr articulated ostracods to 1.5 mm in size, 2% high-spined gastropods to 2 mm long, 1% gastropod frags, tr spoke-shaped dasyclad(?), 1 solitary coral is

70 mm long w/ a 30 mm diameter calyx. 52% microspar, 2% spar along subvertical fractures, 15% f xyn dolomite (35 μ m mode) in mottles, 5% evenly distributed vf-f xyn dolomite, 3% porosity along stylolites and fractures, 5% porosity in dolomitic mottles, misc; minor subvertical fractures terminate at stylolites. Rock Name: mottled dolomitic (vf-f xyn) biomicrosparite. L7h Sample/Slab Description (taken 63.5 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk xlt yellowish orange (10YR 8/2) calc (calcified dolomite) mottles, sedimentary structures; irregularly shaped cm-sized calc (calcified dolomite) mottles, low-amplitude stylolites, composition; one 9 cm-wide *Catenipora* colony (10%), one 8 mm-diameter solitary coral, 10% ossicles (some pentagonally-sided), tr articulated ostracods to 2 mm in size, 3% dasyclads, tr high-spined gastropods to 2 mm in size, tr 1 mm thick shell frag. 72% microspar, 2% silica partly replaces coral, 5% interxyn porosity in calc mottles. Rock Name: mottled (calc) ossicle-rich biomicrosparite. L7i Sample/Slab Description (taken 74.2 m abu), fresh surface colour; m olive brown (10YR 5/3) and wk xlt yellowish orange (10YR 8/2) calc mottles, sedimentary structures; low-amplitude stylolites, 20% cm-sized calc mottles, minor vugs to 3 mm in size in mottles, composition; 10% dasyclad algae, 5% articulated ostracods to 1.5 mm in size, 5% ostracod frags, tr gastropods, one solitary coral w/ a 2 mm diameter calyx. 68% microspar (in part makes up mottles and probably is calcified dolomite), 1% spar fills articulated ostracods, 2% disseminated limonite(?), 5% vf xyn dolomite partly replaces fossil frags, 5% vugs in cream-coloured microsparitic patches, 5% porosity along stylolites and between xtals. Rock Name: calc mottled sl dolomitic biomicrosparite. L7j Sample/Slab Description (taken 83.9 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, composition; 15% ossicles, tr star-shaped ossicle w/ a circular axial canal, tr high-spined gastropods to 1.5 mm in size, 5% dasyclad algae. 40% microspar, 20% f xyn dolomite concentrated in dolomitic mottles. Fossil frags in mottles are only in part replaced, 10% vf-f xyn dolomite is also evenly distributed between mottles, 3% dolomite partly replaces fossil frags, 10% porosity along stylolites. Rock Name: mottled dolomitic (vf-f xyn) biomicrosparite. L7k Sample/Slab Description (taken 98.4 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; cm-sized cream-coloured microsparitic mottles, low-amplitude stylolites, composition; 3% articulated ostracods to 1.5 mm in size, tr plicated brachs, 3% ossicles, one tabular stromatoporoid (recrystallized to spar and in part dolomitized). 78% microspar (microspar in mottles is probably calcified dolomite), 2% spar replaces/fills the stromatoporoid, 1% limonite(?), 3% f xyn dolomite (25 μ m mode) partly replaces stromatoporoid, 15% porosity between xtals in calc mottles and along fractures/stylolites, misc; high concentration of subvertical 'hairline' fractures. Rock Name: calc mottled fossiliferous microsparite. L7l Sample/Slab Description (taken 106.1 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk xlt yellowish orange (10YR 8/2) mottles, sedimentary structures; low-amplitude stylolites are accentuated by limonitic(?) residue, dolomitic microspar (calcified dolomite?) mottles, composition; 5% ossicles (in part dolomitized), 5% ostracod frags, tr spar-filled articulated ostracods to 1 mm in size, 3% dasyclads, 51% microspar (in mottles this may be calcified dolomite), 1% spar along fractures, 20% f-m xyn dolomite is concentrated in the dolomitic mottles, 15% porosity along stylolites/fractures and between xtals in the dolomitic mottles, misc; subvertical fractures terminate at low-amplitude stylolites. Rock Name: mottled dolomitic biomicrosparite. L7m Sample Description (taken 113.4 m abu), sedimentary structures; dolomitic mottles; local brecciation (up to 2 cm-sized clasts), composition; one solitary coral frag on its side w/ an 8 cm diameter calyx, frag is 9 cm long but originally may have been 15 or more cm long. Rock Name: mottled dolomitic coralline biomicrosparite crackle breccia. L7n Sample/Slab/Thin Section Description (taken 113.4 m abu), fresh surface colour; wk m olive-brown (10YR 5/2) w/ vw xlt yellowish orange (10YR 8/1) dolomitic mottles, sedimentary structures; low-amplitude stylolites, subvertical fractures terminate at stylolites, 20% cm-sized irregularly-shaped dolomitic microspar mottles, composition; 3% dasyclad algae, 3% articulated ostracods to 1 mm in size, 10% ostracod frags, 15% ossicles (tr pentagonally-sided), tr gastropods to 1 mm in size, one solitary coral frag to 40 mm in size. 52% microspar (the microspar in the mottles may be calcified dolomite), tr pyrite, 2% white chert, 10% f xyn dolomite (30 μ m mode), 5% porosity along stylolites. CL; dull

orange-luminescent calcite, dolomite luminesces bright orange except for rare blue-luminescent fluorite after dolomite. Spar along fractures is bright orange-luminescent. Rock Name: mottled dolomitic biomicrosparite. Sample L7o taken for conodonts from 111.9 to 115.9 m abu. Sample L7p taken for conodonts from 131.9 to 136.9 m abu. BASE OF UNIT 76.10 TOP OF UNIT 213.00 THICKNESS 136.90

UNIT L8. Weathering Character prom, dolomitic mottles weather out in relief. Colour WS & FS-m brownish grey w/ ochre patches, some malachite stain on bedding planes, elongate wispy mottles as for L7. Basal Contact trans over 1-2 m. Bedding Character wispy, planar irregular. Bed Thickness approx 0.5 m, but bedding is poorly defined. Composition dolomitic ls. Sedimentary Structures mottles. Fossils 3-5% pentamerid brachs, (3-4 cm in size) w/ valves to 4 mm thick, articulated and disarticulated, <1% tabular stromatoporoids (5 cm thick and 15 cm long), 1-2% ossicles, one 2 cm long echinoderm stem 3 m abu, (both in and out of place), favositid corals become larger and more abundant towards top of unit, the largest (approx 0.5 m by 0.4 m) is overturned, pressure solution may locally have dissolved as much as 3 cm of coral along its outer margin. Chain coral approx 4 cm in size 4 m abu, solitary coral (1-5 cm) 3 m abu, syringoporid corals (to 20 x 8 cm in size) 4 m abu. Misc bituminous odour. L8 Sample/Slab Description (of favositid coral 3.9 m abu), fresh surface colour; wk m olive brown (10YR 5/2), composition; 100% favositid coral is filled w/ 75% f xyn spar, 10% microspar, 10% f-m xyn dolomite replaces the coral. 5% fracture and interxyn porosity. Rock Name: 100% favositid coral (overall dolomitic ls). L8a Sample/Slab Description (ossicles 4.0 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 15% ostracod frags, tr articulated ostracods to 1.7 mm, 5% ossicles, many are pentagonally-sided and have a single circular axial canal. 67% microspar, 3% spar fills fractures, 5% f xyn dolomite in dolomitic microspar mottles (microspar may be calcified dolomite), 5% porosity along stylolites and between xtals in mottles. Rock Name: mottled sl dolomitic biomicrosparite. L8b Sample/Slab Description (of 8 by 2 cm-sized coral taken 3 m abu), sedimentary structures; low-amplitude stylolites, composition; coral resembles *Syringopora* but has 8 septa that join in the axial region and well-defined tabulae, 50% microspar between spar-filled corallites, 5% dolomite partly replaces the skeleton, tr porosity, misc; extensively fractured. Rock Name: sl dolomitic/sparry syringoporid biomicrosparite. L8c Sample/Slab (Scree) Description (taken of favositid coral 4 m abu), fresh surface colour; wk m olive brown (10YR 5/2) and wk vlt yellowish orange (10YR 7/2), composition; 100% favositid coral (corallites filled w/ 60% f-m xyn spar, 10% silica replaces coral, 5% interxyn porosity, especially within corallites). Rock Name: mottled siliceous f-m xyn sparite (100% favositid coral). L8d Sample/Slab (Scree) Description (taken of phaceloid coral approx 4 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites are accentuated by limonitic(?) residue, 15% wispy dolomitic f xyn spar mottles occur along stylolites, composition; tr dasyclad algae, 5% ostracod frags, tr articulated ostracods to 5 mm in size (contain geopetal 'spar-over-microspar' fabric), 5% tabular overturned stromatoporoids, 40% phaceloid coral on its side w/ many septa joining axially. 31% microspar, 5% spar along fractures, 4% white silica partly replaces coral skeletons, 5% f xyn dolomite is concentrated in dolomitic spar mottles (spar is probably calcified dolomite), 5% porosity along stylolites and fractures, misc; minor subvertical fractures terminate at stylolites. Rock Name: mottled sl dolomitic/sl silicified/sl sparry coralline biomicrosparite. L8e Sample/Slab Description (of pentamerid brachs taken approx 2 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, vugs to 15 mm in size (partly dissolved stromatoporoid), composition; 3% spar-filled ostracods to 2 mm in size, 3% ossicles, tr plicated brach frags, 20% pentamerid brach valves to 45 mm in size (15 mm thick valves). 54% microspar, 10% spar along subvertical fractures, 3% white silica partly replaces stromatoporoid skeletons. 10% porosity along stylolites, mottles and vugs, misc; extensive 'hairline' subvertical fractures terminate at stylolites. Rock Name: sparry biomicrosparite. BASE OF UNIT 213.00 TOP OF UNIT 220.50 THICKNESS 7.50

UNIT L9. Weathering Character semi-rec, platy scree. Colour WS-sl greenish lt grey, FS-m

brown. Basal Contact trans over 10 cm. Bedding Character planar, lam/bedded and fissile. Bed/Lam Thickness variable, min <1 mm, max 3 cm (parting thickness). Composition f xyn shaley ls. Sedimentary Structures planar lam, mudcracks, ripple marks, and synaeresis cracks. Burrows on bedding surfaces, similar to mottles in units L7 & 8. Fossils ostracods. L9 Sample/Slab Description (of leperditid ostracods, taken 1 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), composition; 25% disarticulated leperditid ostracod valves to 9 mm in size (up to 100 μ m thick), some of which have been crushed, ostracod valves are microsparitic. 5% microspar, 2% pyrite, tr clay films, 63% vf xyn dolomite, 5% porosity. Rock Name: sl microsparitic ostracodal vf xyn dolostone. L9a Sample/Slab Description fresh surface colour; 2.5Y 5/2 (wk m brownish olive), sedimentary structures; symmetrical ripple marks (40 mm wavelength and 3 mm amplitude). 10% spar, 2% pyrite accumulations to 1 mm in size, 3% interxyn f xyn pyrite, 80% silt-sized quartz gns, 5% porosity. Rock Name: sl pyritic/sparry (f xyn) quartz siltstone. L9b Sample/Slab Description fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; polygonal desiccation cracks, low-amplitude stylolites, composition; 5% disarticulated ostracod valves to 6 mm in size, 1% spar-filled articulated ostracods. 49% microspar, tr pyrite, 5% silt-sized quartzose gns, clay(?), 25% vf xyn dolomite, 15% porosity along stylolites and between xtals/gns. Rock Name: sl silty (quartzose)/dolomitic ostracod-bearing microsparite (originally detrital calcilitute). L9c Sample/Slab/Thin Section Description fresh surface colour; vlt yellowish-orange (2.5Y 7/3), sedimentary structures; minor low-angle cross-lams, 7 cm wide polygonal mudcracks, low-amplitude stylolites, composition; tr ostracods to 7 mm in size. 38% microspar, 5% spar, 2% hematite(?) in part altered to limonite(?), 40% quartzose silt (30 μ m mode). 5% porosity along stylolites, 10% porosity between xtals especially near stylolites. CL; 20% blue-luminescent quartz, 40% non-luminescent dolomite, 40% orange-luminescent calcite, tr yellow-luminescent silicates(?). Rock Name: sl sparry/microsparitic quartzose siltstone. BASE OF UNIT 220.50 TOP OF UNIT 223.00 THICKNESS 2.50

UNIT L10. Weathering Character semi-prom. Colour WS-m brownish grey w/ irregular ochre patches on joints, FS-lt brownish grey. Basal Contact covered. Bedding Character mottled, planar irregular, bedding is less apparent 10 m abu and is massive 12.0 m abu. Bed/Lam Thickness min 2 cm, max 10 cm, mode 5 cm. Composition ls w/ approx 0.3 mm xtal size, some malachite staining 34.5 m abu, at 64.0 m abu-partly covered but still mottled ls (small plateau). Sedimentary Structures mottle concentration decreases upwards to 10 m abu, then again mottled at 21 m abu, mottles are very distinct 35 m abu (25-35% buff mottles in a brown grey ls). Fossils abundant solitary corals (approx 3 cm long, 1 cm diameter), favositid corals 55 m abu, disarticulated pentamerid brachs to 3 cm in size, some corals overturned, at 30.5 m abu there is a macluritid gastropod (approx 4 cm diameter), large disarticulated pentamerid brachs occur 33.0 m abu, recrystallized orthocone approx 10 cm long 47.5 m abu, more brachs and ossicles 64.0 m abu and from 69.0 to 71.3 m abu echinoderm stems w/ star-shaped axial canals. Misc small plateau 47.5 m abu. L10 Sample/Slab Description (of a solitary and colonial coral, and rare disarticulated ostracods), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 10% ostracod frags, 1% spar-filled articulated ostracods to 1 mm in size, one 35 mm long solitary coral (on its side). 24% microspar, 20% f xyn spar is concentrated along subvertical fractures, 10% silt-sized quartz gns, 25% vf-f xyn dolomite, 10% porosity along stylolites and fractures and between xtals/gns. Rock Name: silty (quartzose)/dolomitic/sparry ostracodal biomicrosparite. L10a Sample/Slab Description (litho sample w/ favositid coral), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 1% solitary corals (to 7 mm in size) the septa of which are lined w/ f xyn dolomite and filled w/ f-m xyn spar, 10% stromatoporoids, one is grown on a brach valve (now overturned), another is tabular and partly silicified (50 x 5 mm), 1% spar-filled articulated ostracods to 2 mm in size. One favositid coral (10%) and one plicated brach valve are both 35 mm in size. 38% microspar, 15% f-m xyn spar along 'hairline' fractures, 15% f xyn dolomite, 10% porosity along stylolites and between xtals, misc; minor subvertical fractures terminate at stylolites. Rock Name: dolomitic/sparry biomicrosparite. Sample L10b taken for conodonts from 0 to 4.3 m abu. L10c Sample/Slab Description (taken 12.5 m abu),

fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; irregular dolomitic mottles, composition; 25% ostracod frags, one echinoderm stem frag, 3% ossicles, one solitary coral frag. 42% microspar, 5% spar, 20% f xyn dolomite (30 μ m mode), 5% porosity between xtals. Rock Name: sl sparry/dolomitic ostracodal biomicrosparite. L10d Sample/Slab Description (brachs), fresh surface colour; overall wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites along which dolomite is concentrated. This defines wispy dolomitic stringers elongate parallel to bedding, composition; 20% brach frags, 15% pentamerid brachs to 25 mm in size (most are disarticulated), 3% tabular stromatoporoids (36 by 10 mm in size), one has grown around an echinoderm stem, one solitary coral (4 mm diameter w/ approx 18 septa), tr *Catenipora*. 22% peloids (composed of microspar), 15% f xyn spar between peloids, 15% f xyn dolomite (40 μ m mode) concentrated in mottles, 10% porosity between xtals especially in dolomitic mottles. Rock Name: mottled dolomitic/brachiopodal biopelsparite. L10e Sample/Slab (Scree) Description (taken 37.0 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites are accentuated by irregular dolomitic mottles that 'skirt' the articulated brachs, composition; 20% brachs to 35 mm (some articulated valves to 2 mm thick), 5% tabular stromatoporoids, minor plicated brachs, tr dolomitic *Catenipora* w/ corallites filled w/ spar, 2% ostracods (to 1 mm in size), 2% ossicles, tr gastropods. 10% microspar, 1% white chert nodules to 2 mm in stromatoporoids, 45% f xyn dolomite (50 μ m mode) is concentrated in dolomitic mottles, misc; minor subvertical fractures terminate at stylolites. Rock Name: mottled fossiliferous/microsparitic f xyn dolostone. Sample L10f taken for conodonts from 46.0 to 55.0 m abu. L10g Sample/Slab Description (brachs taken from 55.3 to 55.6 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites are accentuated by limonitic residue, composition; 25% mainly disarticulated costate pentamerid valves to 55 mm long and 5 mm thick (most are pedicle valves), a second type of brach is small (1 cm) and c plicate, tr ostracods, 10% brach frags, tr sponge spicules, tr echinoderm stems to 5 mm long, 1% ossicles, some circular but w/ pentagonally sided axial canals, tr gastropods, tr solitary corals. 11% microspar, 15% c xyn spar lines fractures, tr malachite and pyrite, 3% scattered white chert 'nodules' 1 mm in size, extensive subvertical fractures terminate at stylolites, some are microfaults, 15% f-m xyn dolomite (50 μ m mode), 20% interxyn porosity (especially in dolomitic mottles). Rock Name: mottled dolomitic/brachiopodal biomicrosparite. L10h Sample/Slab Description (brachs taken from 60.0 to 61.5 m abu), fresh surface colour; wk m olive brown (10YR 5/2) w/ wk vlt yellowish orange (10YR 7/2) dolomitic mottles, sedimentary structures; low-amplitude stylolites are accentuated with limonitic(?) residue, composition; 20% pentamerid brach valves (to 45 mm in size and 2 mm thick), 2% ostracods to 1 mm in size, 2% ossicles, one solitary coral, 15% microspar, 1% vc xyn spar lines vugs, tr white silica and tr pyrite, 45% f xyn dolomite is pervasive except below convex-up brach valves, 15% porosity along stylolites and between xtals (especially in dolomitic mottles). Rock Name: mottled microsparitic/brachiopodal f xyn dolostone. Sample L10b taken for conodonts from 0 to 4.3 m abu. L10f taken for conodonts from 46.0 to 55.0 m abu.

BASE OF UNIT 223.00 TOP OF UNIT 294.30 THICKNESS 71.30

UNIT L11. Weathering Character rec covered interval.

BASE OF UNIT 294.30 TOP OF UNIT 295.00 THICKNESS 0.70

UNIT L12. Weathering Character semi-prom. Colour WS-m grey, FS-lt brown. Basal Contact covered. Bedding Character inversely-graded breccia (laterally continuous for at least 100 m but grades into scree). Composition crackle to rubble breccia w/ ls clasts, clast size min 1 cm, max 15 cm, mode 5-10 cm, 85% clasts, 15% 'matrix', clasts are ang and become larger (to 20 cm) approx 4 or 5 m abu. Sedimentary Structures high-amplitude stylolites, some of the larger clasts are planar lam. L12 Sample/Slab/Thin Section Description (taken from the base of the unit), fresh surface colour; breccia, overall wk m olive brown (10YR 5/2) w/ some wk vdk olive brown (10YR 3/2) clasts, sedimentary structures; vugs between clasts to 3 mm in size, high-amplitude stylolites where breccia clasts meet, composition; 70% breccia

clasts (min 2 mm, max 45 mm, mode 20 mm), consist mainly of f xyn sparite, 5% sl dolomitic sparite clasts, one of which displays a 'solution microunconformity' in which the central lams of one clast have dissolved. This has resulted in an ang relationship between the laminae of the clast, 'matrix' consists of f-m xyn sparite and com has inclusion-rich cores and clear rims. CL; 20% orange-luminescent calcite overgrowths on spar. FLUOR; pervasive thick fluorescent rhombic spar overgrowths on peloids. Rock Name: c calcirudite-sized rubble breccia: dolomitic f xyn sparite 'clast'-f to m xyn sparite 'matrix' breccia. Sample L12a taken for conodonts from the basal 4 m of the unit.

BASE OF UNIT 295.00 TOP OF UNIT 313.00 THICKNESS 18.00

UNIT L13. Weathering Character rec covered interval.

BASE OF UNIT 313.00 TOP OF UNIT 319.50 THICKNESS 6.50

UNIT L14. Weathering Character semi-prom. Colour WS and FS-grey, mottled rust and buff, greenish. Basal Contact covered. Bedding Character mottled. Composition ls, flowstone at or near the contact between mottled ls and a small breccia pipe. Fossils 5% of rock, orthocone at 24 m abu, approx 1% pentamerid brachs as for lower units, in place favositid coral, approx 1% stromatoporoids. Sample L14 taken for conodonts.

BASE OF UNIT 319.50 TOP OF UNIT 350.00 THICKNESS 30.50

The present erosion surface is estimated to occur 27 m below the Cape Crauford Formation i.e., 27 m of the uppermost part of the Baillarge Formation is eroded at this locality.

O. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION M, MEASURED IN 1984.

Locality: 30 km SW of Cape Crauford on the coast. The base of section M is taken as sealevel.

Latitude: 73°31'51"N.

Longitude: 85°26'W.

Section M is entirely in the Ship Point Formation.

Section M at 27.5 m is taken to be equivalent to section MX at 0 m (there is a general northward dip to the strata).

UNIT M1. Weathering Character semi-prom. Colour WS brownish grey w/ white mottles. FS brownish grey and tan w/ white mottles. Basal Contact sealevel (Admiralty Inlet). Bedding Character irregular mottles. Bed Thickness min 10 cm, max 50 cm, mode 20 cm. Composition c xyn dolostone, modal xtal size 0.25 mm (0.4 mm 10 m abu). Sedimentary Structures mottles. Fossils approx 1% poorly preserved chain corals(?). M1 Sample/Slab/Thin Section Description (taken at sealevel), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, composition; 90% m xyn dolomite (125µm mode) w/ anhedral intergrown texture, 10% porosity along stylolites/fractures and between xtals. CL; uniform moderate orange-red luminescent dolomite, clear vug-lining dolomite is zoned. Rock Name: m xyn dolostone. M1a Sample/Slab Description (taken at sealevel), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, composition; 85% m-c xyn dolomite, 15% porosity along stylolites/fractures and between xtals, misc; minor subvertical fractures. Rock Name: m-c xyn dolostone. Misc outcrop forms steps along bedding planes, dolomitic(?) subvertical veins. This unit is very well indurated.

BASE OF UNIT 0.00 TOP OF UNIT 30.00 THICKNESS 30.00

P. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION MX, MEASURED IN 1984.

Locality: 29.7 km SW of Cape Crauford on the coast.

Latitude: 73°32'06"N.

Longitude: 85°25'W.

The basal 10 m of section MX is in the Ship Point Formation.

Section MX at 63.4 m is taken as equivalent to section N at 0 m.

UNIT MX1. Weathering Character rec covered interval. Basal Contact sealevel (0 m).

BASE OF UNIT 0.00 TOP OF UNIT 3.00 THICKNESS 3.00

UNIT MX2. Weathering Character semi-prom. Colour WS-m brownish grey, FS-m brown. Basal Contact covered. Bedding Character mottled, planar irregular. Bed/Lam Thickness min 8 mm, max 10 cm. Composition dolostone. Sedimentary Structures mottles. Fossils one high-spined 3 cm-long gastropod (1.5 m abu) and one recrystallized orthoconic nautiloid.

BASE OF UNIT 3.00 TOP OF UNIT 6.85 THICKNESS 3.85

UNIT MX3. Weathering Character rec covered interval.

BASE OF UNIT 6.85 TOP OF UNIT 7.55 THICKNESS 0.70

UNIT MX4. Description as for MX2.

BASE OF UNIT 7.55 TOP OF UNIT 8.00 THICKNESS 0.45

UNIT MX5. Weathering Character semi-rec. Colour WS-buff, FS-lt brownish grey. Basal Contact planar, trans over 10 cm. Bedding Character planar. Bed Thickness min 1 cm, max 10 cm, mode 5 cm. Composition dolostone. Sedimentary Structures minor mottles. Fossils recrystallized. MX5 Sample/Slab Description (taken 10 cm abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, composition; 85% f-m xyn dolomite (40 μ m mode), 15% interxyn porosity. Rock Name: f-m xyn dolostone.

BASE OF UNIT 8.00 TOP OF UNIT 8.50 THICKNESS 0.50

UNIT MX6. Weathering Character semi-rec. Colour WS-interbedded dk grey, m brownish grey, FS-lt brownish grey w/ m dk grey interbeds. Basal Contact trans, planar over 10 cm. Bedding Character planar irregular. Bed Thickness min 3 mm (shale), max 10 cm, mode NA. Composition dolostone w/ minor organic(?) black shale, tr black chert lenses. MX6 Sample/Slab Description (rep litho sample taken 0.3 m abu), fresh surface colour; overall lt olive brown (10YR 6/3), sedimentary structures; low-amplitude stylolites are accentuated by black carb(?) film, minor bioturbation, planar to irregular lams, composition; tr ostracods to 1.3 mm long, tr microspar and pyrite, 85% f-m xyn dolomite (50 μ m mode), 15% porosity along stylolites and between xtals. Rock Name: f-m xyn dolostone.

BASE OF UNIT 8.50 TOP OF UNIT 10.00 THICKNESS 1.50

The top of unit MX6 is taken as the contact between the Ship Point Formation and member A of the Baillarge Formation.

UNIT MX7. Weathering Character rec covered interval. Sample MX7 (from scree) is a 12 cm-sized moderately well preserved *Receptaculites* in mottled dolomitic microsparite, colour is wk m olive brown (10YR 5/2) w/ vlt orangy yellow (2.5Y 7/3) mottles.

BASE OF UNIT 10.00 TOP OF UNIT 88.50 THICKNESS 78.50

UNIT MX8. Weathering Character prom. Colour WS-m grey w/ irregular rusty mottles on joint surfaces. FS-lt brown. Basal Contact covered. Bedding Character interbedded ls and argil ls, wavy irregular. Bed Thickness 1 mm, max 20 cm. Composition 2 rock types, the first is fissile argil(?) ls w/ 1-3 mm thick lams; the second is ls (microsparite). Argil ls beds alternate w/ ls beds on a scale of approx 5-20 cm, but this is extremely variable. Sedimentary

Structures convex-up structures occur in the shaley units. Misc one of the microsparitic units is a ls pebble conglomerate approx 3 cm thick 0.5 m abu. Samples MX8 taken for conodonts. MX8a Sample/Slab Description (litho sample of ls pebble conglomerate taken 90.0 m abu), fresh surface colour; overall wk m olive brown (10YR 5/2), sedimentary structures; intraclasts, composition; 80% flat rd intraclasts to 65 mm long (composed of microspar to dolomitic microspar), many of the dolomite rhombs in both intraclasts and matrix have been calcified. Some intraclasts consist of ostracodal biomicrospars and the 'matrix' consists of dolomitic (f-m xyn) f-c xyn spar w/ 3% ossicles between clasts, 10% dolomite, 10% porosity between clasts, misc; minor slickensides on bedding plane surfaces. Rock Name: dolomitic intrasparite.

BASE OF UNIT 88.50 TOP OF UNIT 90.80 THICKNESS 2.30

UNIT MX9. Weathering Character semi-rec. Colour WS-lt grey, FS-sl bluish lt grey. Basal Contact planar abrupt. Bedding Character 1 mm thick planar lams. Composition argil ls.

BASE OF UNIT 90.80 TOP OF UNIT 91.00 THICKNESS 0.20

UNIT MX10. Weathering Character semi-prom. Colour WS and FS variable, m brownish grey. Bedding Character sl wavy. Bed Thickness 15 mm mode. Litho dolomitic ls.

BASE OF UNIT 91.00 TOP OF UNIT 91.30 THICKNESS 0.30

UNIT MX11. Weathering Character semi-prom. Colour WS-variable m grey rd intraclasts in a lt grey matrix. Basal Contact abrupt, sl wavy, erosionally truncates very thin beds including imbricated intraclasts of unit MX10. Bedding Character sl wavy. Bed Thickness equals unit thickness. Composition ls pebble conglomerate, max pebble size is approx 8 cm w/ a mode of 1.5 cm, pebbles are generally elongate, poorly sorted and imbricated. Sedimentary Structures intraclasts, (approx 5 cm in size) in basal 5 cm. Intraclasts fine up in basal 10 cm although there are larger clasts in the upper 25 cm. Fossils one gastropod and some disarticulated brachs. MX11 Sample/Slab/Thin Section Description (taken 10 cm abu), fresh surface colour; overall wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites and minor dolomitic mottles (to 5 mm in size), composition; 25% intraclasts to 3 mm in size, one contains disarticulated ostracod frags, 15% brach frags, 5% ossicles, one articulated ostracod is 2 mm in size. 5% micrite, 20% microspar, tr pyrite, 15% vf-f xyn dolomite is concentrated in mottles along stylolites and 10% is evenly distributed between mottles, minor calcified dolomite. 5% porosity along subvertical fractures and stylolites. CL; pervasive bright orange luminescence except for dull orange-luminescent fossil frags. Rock Name: sl micritic/dolomitic brachiopodal intramicrosparrite. MX11a Sample/Slab/Thin Section Description (taken near the base of the unit), fresh surface colour; overall wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, some intraclasts have been truncated by erosion, composition; 60% rd intraclasts to 60 mm long and 10 mm thick consist of microspar or dolomitic (f-m xyn) microspar, matrix is dolomitic (f xyn) microspar to microsparitic f xyn dolomite w/ 5% micrite. 10% ostracods, 2% ossicles, tr brachs and gastropods, 5% f-c xyn spar, 3% disseminated f xyn pyrite, overall 10% f xyn dolomite. 5% porosity along stylolites and fractures, high interxyn porosity near stylolites, misc; subvertical fractures terminate at stylolites. CL; pervasive bright orange-luminescent calcite except for fossil frags, 5% blue-luminescent quartz. Rock Name: dolomitic sl sparry/sl micritic ostracodal intramicrosparrudite.

BASE OF UNIT 91.30 TOP OF UNIT 91.65 THICKNESS 0.35

UNIT MX13. Weathering Character semi-prom. Colour WS-brownish grey, FS-brown. Basal Contact wavy. Composition mottled ls.

BASE OF UNIT 91.65 TOP OF UNIT 91.85 THICKNESS 0.20

UNIT MX14. Weathering Character prom. Colour WS-lt to m grey w/ orangy yellow patches, FS-m brown. Basal Contact planar abrupt. Bedding Character planar, locally wavy, approx 5 cm wavelength. Bed Thickness min 4 cm, max 15 cm, (thick beds at base), beds thin to the top of the unit. Composition microsparite. Sedimentary Structures high-amplitude stylolites.

Misc pyrolusite(?) dendrites on joint faces approx 35 cm abu. MX14 Sample/Slab Description (taken 10 cm abu, pyrolusite(?) dendrites), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; minor low-amplitude stylolites, tr vugs to 2 cm are lined w/ c xyn spar, composition; tr ostracod frags to 2 mm in size. 82% microspar, 3% spar, 10% evenly distributed f xyn dolomite, 5% porosity along fractures. Rock Name: dolomitic microsparite. BASE OF UNIT 91.85 TOP OF UNIT 92.55 THICKNESS 0.70

UNIT MX15. Weathering Character prom. Colour WS-buff, FS-lt grey. Basal Contact trans, wavy over approx 15 cm. Bedding Character convex-up structures within breccia, overlie 40 cm of breccia that contains stylolites w/ amplitudes to at least 6 mm, wavy (0.6 m wavelength, 20 cm amplitude). The convex-up structures are in turn overlain by an inversely-graded breccia containing stylolites w/ amplitudes to at least 7 mm (accentuated by dk residue). Bed/Lam Thickness min 1 cm, max 2 cm. Composition microsparite, locally brecciated. Sedimentary Structures high-amplitude (to 7 mm) stylolites and convex-up structures in breccia. MX15 Sample/Slab/Thin Section Description (rep litho and conodont sample), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, porosity is high near stylolites where microspar is recrystallized to f xyn spar, composition; 50% microspar, 15% f xyn spar, 15% evenly distributed f xyn dolomite, calcified dolomite is com, 20% porosity along stylolites and fractures. A large number of subvertical fractures terminate at stylolites. CL; pervasive bright orange-luminescent calcite, 5% blue-luminescent quartz(?). FLUOR; dolomite fluoresces. Rock Name: sparry/dolomitic microsparite. MX15a Sample/Slab/Thin Section Description (rep litho sample taken approx 15 cm abu), fresh surface colour; mottled wk lt olive brown (10YR 6/2) and wk dk olive brown (10YR 4/2), sedimentary structures; high-amplitude stylolites, composition; 40% microspar, 35% f xyn spar, 15% f xyn dolomite w/ com calcified dolomite, 10% porosity along stylolites and fractures, misc; minor subvertical fractures terminate at stylolites. CL; pervasive bright orange-luminescent calcite, 3% blue-luminescent fluorite after dolomite. Rock Name: dolomitic (f xyn) sparry microsparite. MX15b Sample/Slab Description fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; tr vugs to 8 mm in size, one contains a pyritic(?) accumulation, low- and high-amplitude (to several mm) stylolites, composition; 70% microspar, 14% spar, 1% pyrite(?) (in part altered to limonite?), 15% porosity along fractures, vugs and between xtals, misc; subvertical fractures terminate at stylolites. Rock Name: sparry (f xyn) microsparite. BASE OF UNIT 92.55 TOP OF UNIT 93.10 THICKNESS 0.65

UNIT MX16. Weathering Character prom. Colour WS & FS-buff. Basal Contact trans over 10-20 cm. Bedding Character inversely-graded breccia. Composition ls breccia w/ approx 5% chert clasts. Sedimentary Structures vugs, low- and high-amplitude stylolites. MX16 Sample/Slab/Thin Section Description (large sample taken from the base of the unit), fresh surface colour; breccia, variable, overall wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites accentuated w/ limonitic residue, composition; breccia, 70% clasts have irregular stylolitic boundaries and have sbang-sbrd shapes, clast size range is 2-40 mm, mode 20 mm, clasts include 25% polyxyn (f-c xyn) quartz (w/ high interxyn porosity), 45% microsparite and pelsparite clasts, 15% 'matrix' is f xyn sparite. 22% porosity is distributed as 5% along stylolites, 10% between clasts, 5% between xtals within clasts, 2% vugs, tr pyrite. CL; pervasive moderate orange-luminescent calcite, chert is non-luminescent, 3% blue-luminescent quartz. Rock Name: c calcirudite rubble breccia; polyxyn quartz-pelsparite 'clasts' in a f xyn 'sparite' 'matrix'. BASE OF UNIT 93.10 TOP OF UNIT 93.70 THICKNESS 0.60

UNIT MX17. Weathering Character prom. Colour WS-buff, FS-lt brown. Basal Contact trans over 1 m. Bedding Character breccia w/ rotated clasts to 1 m in size, trans to bedded strata at the top of the unit. Bed/Lam Thickness min 1 cm, max 5 cm, mode 2 cm, crackle to mosaic breccia locally. Composition ls w/ pyrolusite(?) dendrites on bedding planes. Sedimentary Structures planar irregular lams. Fossils thin-shelled disarticulated brachs (approx 5 mm in size) about 0.75 m abu. MX17 Sample/Slab Description (brach sample taken

1 m abu), fresh surface colour; mottled wk vlt yellowish orange (10YR 7/2) and wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 5% ossicles, 10% brach frags, 76% microspar, a dk grey opaque mineral (2%) w/ dendritic growth habit (pyrolusite?), 5% f xyn dolomite, 2% porosity along stylolites. Rock Name: sl dolomitic biomicrosparite. Sample MX17a taken for conodonts. MX17b (Scree) Sample Description contains a coiled nautiloid 80 mm in diameter that resembles *Curtoceras* but is more evolute. BASE OF UNIT 93.70 TOP OF UNIT 97.00 THICKNESS 3.30

Q. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION N, MEASURED IN 1984.

Locality: 29.0 km SW of Cape Crauford on the coast.

Latitude: 73°32'24"N.

Longitude: 85°25'W.

Section N is entirely within member A of the Baillarge Formation.

Section N at 0 m is taken as equivalent with section MX at 63.4 m and section N at 54 m is taken as equivalent to section P at 54.3 m.

UNIT N1. Weathering Character rec covered interval. Basal Contact sealevel (Admiralty Inlet).

BASE OF UNIT 0.00 TOP OF UNIT 1.50 THICKNESS 1.50

UNIT N2. Weathering Character prom. Colour WS & FS-lt grey w/ buff mottles. Basal Contact covered. Bedding Character 2 cm-sized mottles are elongate parallel to bedding. Bed Thickness min 15 cm, max 1.0 m, mode NA. Composition mottled ls becomes massive in the upper 0.6 m, sample N2a is very argil. Sedimentary Structures minor high-amplitude stylolites. Misc white c xyn carbonate lines joints. N2 Sample/Slab Description (taken 1.3 m abu), fresh surface colour; wk m olive-brown (10YR 5/2), sedimentary structures; minor low- & high-amplitude stylolites are accentuated by dk grey residue to 75µm thick, 30% relict dolomitic microspar/f xyn spar as mottles, composition; 20% microspar, 5% spar, tr pyrite, 60% f-m xyn dolomite, 15% interxyn porosity, misc; minor subvertical fractures terminate at stylolites. Rock Name: mottled microsparitic/sparitic f-m xyn dolostone. Sample N2a taken for conodonts.

BASE OF UNIT 1.50 TOP OF UNIT 4.25 THICKNESS 3.15

UNIT N3. Weathering Character prom. Colour WS and FS buff. Basal Contact planar, abrupt. Bedding Character planar bedded. Bed/Lam Thickness min 5 cm, max 50 cm. Composition dolostone w/ 0.1 to 0.2 mm xtal size. Sedimentary Structures planar bedded, sl irregular. N3 Sample/Slab/Thin Section Description (taken 0.6 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; low-amplitude stylolites w/ associated sl greenish clay-rich(?) wisps. composition; 2% f xyn spar between dolomite rhombs, 5% quartz replaces dolomite, 68% f xyn dolomite (40µm mode) is com leached, 25% interxyn porosity. CL; 5% blue-luminescent quartz, dolomite luminesces a bright orange. FLUOR; patchy fluorescence. Rock Name: argil f xyn dolostone.

BASE OF UNIT 4.25 TOP OF UNIT 6.10 THICKNESS 1.75

UNIT N4. Weathering Character prom. Colour WS & FS-lt brown. Basal Contact trans. Bedding Character planar bedded but grades to lam 3.9 m abu. Bed/Lam Thickness min 5 cm, max 30 cm, mode 10 cm. Composition sl calc dolostone, otherwise is similar to N3. N4 Sample/Slab Description (rep litho sample taken 1.4 m abu), fresh surface colour; vlt orangy yellow (2.5Y 7/3), sedimentary structures; irregularly-shaped mottles, composition; 15% microspar concentrated in some lams, 3% f xyn spar, 1% aphanoxyn/vf xyn pyrite, 61% f xyn dolomite (10-40µm), com and good examples of calcified dolomite (microspar replacing dolomite cores), 20% interxyn porosity. Rock Name: microsparitic f xyn dolostone. N4a

Sample/Slab Description (rep litho sample taken 6.2 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; minor scouring, sample has a patterned mottle appearance (resembling wood gn), composition; 85% dololomite and vf gn dolarenite, dolomitic gns at base of one scour are vf gn dolarenite-sized. 15% interxyn porosity. Rock Name: interlam m dololomite and vf gn dolarenite.

BASE OF UNIT 6.10 TOP OF UNIT 13.50 THICKNESS 7.40

UNIT N5. Weathering Character semi-prom. Colour WS-interlam lt and m grey, FS-lt brown. Basal Contact planar, abrupt. Bedding Character planar lam, fissile. Bed/Lam Thickness min 2 mm, max 1 cm. Composition unfossiliferous ls w/ carb film on lams, possibly argil. N5 Sample/Slab/Thin Section Description (rep litho sample taken 30 cm abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; minor scours, planar-irregular lam (min 1 mm, max 10 mm), composition; 15% microspar, 5% monoxyn quartz gns, 60% dololomite to dolarenite gns (now rhombs), good examples of calcified dolomite. 20% interxyn porosity. CL; 1% uniformly scattered blue-luminescent quartz, pervasive orange-red luminescent (in part zoned) dolomite. FLUOR; cores of dolomite rhombs fluoresce. Rock Name: microsparitic/argillaceous interlam f gn dololomite to vf dolarenite. Sample N5a taken for conodonts (very argil).

BASE OF UNIT 13.50 TOP OF UNIT 14.00 THICKNESS 0.50

UNIT N6. Weathering Character prom. Colour WS & FS-lt brown. Basal Contact covered. Composition sl calc dolostone.

BASE OF UNIT 14.00 TOP OF UNIT 14.90 THICKNESS 0.90

UNIT N7. Weathering Character rec covered interval.

BASE OF UNIT 14.90 TOP OF UNIT 17.80 THICKNESS 2.90

UNIT N8. Description as for N4.

BASE OF UNIT 17.80 TOP OF UNIT 20.35 THICKNESS 2.55

UNIT N9. Weathering Character rec covered interval except for an isolated outcrop 1.65 m abu that is similar to N4.

BASE OF UNIT 20.35 TOP OF UNIT 24.80 THICKNESS 4.55

UNIT N10. Weathering Character prom. Colour WS-m grey w/ rust-coloured patches, FS-brownish grey. Basal Contact covered. Bedding Character columnar stromatolites and planar beds, individual columns to 5 cm wide, normally w/ rd elongate intraclasts between them. Composition fissile lam ls w/ parting along carb or shaley films, locally shaley in lenses approx 10 cm thick, alternating blocky and platy beds, approx 10 cm thick in top 2 m of unit. N10a Sample/Slab/Thin Section Description (rep litho sample taken from a massive bed 1.9 m abu), fresh surface colour; wk lt olive-brown (10YR 6/2) intraclasts and wk dk olive-brown (10YR 4/2) stromatolites, sedimentary structures; columnar stromatolites, many grown on large rd elongate intraclasts which range to 60 mm long and 15 mm wide. The stromatolitic columns are up to 40 mm wide and 70 mm high w/ convex-up lams, 25% intraclasts are composed of dolomitic (f-m xyn) microspar, some contain coated gns to 200µm in size (probably ooids), 25% peloids (composed of microspar) occur in the stromatolites. 10% f-m xyn spar between peloids and coated gns, 3% monoxyn quartz replaces some dolomite rhombs, overall 22% f-m xyn dolomite but is more concentrated between stromatolitic columns and between intraclasts, calcified dolomite is com as clear microspar after dolomite rhombs, in some examples dolomite crystal cores are replaced. 5% vugs to 5 mm in size, 10% porosity between peloids/xtals in the stromatolites. CL; dolomite is non-luminescent, 15% quartz gns are blue-luminescent and are concentrated between stromatolites, calcite luminesces a moderate orange. FLUOR; fluorescent scalenohedral isopachous spar cement coats fossil frags. The cement between fossil frags is non-fluorescent. Rock Name: dolomitic/intraclastic/stromatolitic pelmicrosparite. N10b Sample/Slab Description (rep litho sample taken 2.2 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; planar

lam, low-amplitude stylolites, composition; 80% microspar, 5% f xyn spar, 5% f xyn dolomite (25 μ m mode), 10% porosity between xtals. Rock Name: sl dolomitic/sl sparry microsparite. Sample N10 taken for conodonts.

BASE OF UNIT 24.80 TOP OF UNIT 27.50 THICKNESS 2.70

UNIT N11. Weathering Character prom. Colour WS-m grey w/ rust-coloured patches, FS-m grey. Basal Contact planar. Composition ls intraclasts (larger than 10 cm). Fossils ossicles at top of unit. N11 Sample/Slab/Thin Section Description (rep litho sample), fresh surface colour; overall vwk dk olive-brown (10YR 4/1), composition; 59% rd intraclasts (to 65 mm long by 15 mm wide), are composed of dolomitic (f xyn) microspar or dolomitic pelmicrospar, peloids (to 75 μ m) have radially directed spar coatings). Some intraclasts are themselves composed of intraclasts. 15% thin-shelled brach frags between intraclasts, tr ossicles. 10% microspar, 10% f-c xyn spar between intraclasts, 1% pyrite, dolomite is mainly concentrated in intraclasts and calcified dolomite is com, 5% porosity between intraclasts. CL; a generally bright orange-luminescent calcite, 3% blue-luminescent quartz gns are concentrated in intraclasts. Rock Name: dolomitic/microsparitic/brachiopodal intrasparite.

BASE OF UNIT 27.50 TOP OF UNIT 27.75 THICKNESS 0.25

UNIT N12. Description as for N10.

BASE OF UNIT 27.75 TOP OF UNIT 28.20 THICKNESS 0.45

UNIT N13. Weathering Character prom. Description ls pebble conglomerate as for N11.

BASE OF UNIT 28.20 TOP OF UNIT 28.40 THICKNESS 0.20

UNIT N14. Weathering Character prom. Composition unit consists of N11 type ls conglomerate, N10 type fissile ls and massive ls as follows: 28.40-29.30 m; mls (massive ls), 29.3-29.65 m; ls cong, 29.65-30.25 m; fls (fissile ls), hummocky structures 1 m wide and 20 cm high, not as shaley as N10, 30.25-30.65 m; ls breccia w/ chert clasts, 30.6-33.0 m; mls, 33.0-36.0 m; dolostone, 36.0-39.0; dolomitic ls (sample N14a). Sedimentary Structures high-amplitude stylolites. N14 Sample/Slab Description (taken 1.9 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; high-amplitude (to 5 mm) stylolites, breccia clast boundaries are stylolites. The boundaries of rotated clasts are also high-amplitude stylolites. composition; breccia, but 'clasts' are difficult to distinguish from 'matrix', clasts have a max size of 27 mm, but these are themselves crackle brecciated, a mode of 10 mm is tentatively assigned, 10% of the 'clasts' consist of white chert while 65% consist of sparry microsparite w/ rare pyrite. 25% porosity. Rock Name: m calcirudite-sized crackle breccia; polyxyn quartz-sparry microsparite clast breccia. N14a Sample/Slab Description (of dolomitic ls taken 10.6 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), composition; 20% microspar, 70% f-m xyn dolomite (50 μ m mode), 10% interxyn porosity. Rock Name: microsparitic f-m xyn dolostone.

BASE OF UNIT 28.40 TOP OF UNIT 39.00 THICKNESS 10.60

UNIT N15. Weathering Character rec covered interval.

BASE OF UNIT 39.00 TOP OF UNIT 44.10 THICKNESS 5.10

UNIT N16. Weathering Character prom, from a distance it is a distinctive dk grey cliff-forming unit. Colour WS-tan mottles in a brown 'matrix'. FS-lt brown. Basal Contact covered. Bedding Character mottled, planar irregular. Bed Thickness min 5 cm, max 15 cm, mode 10 cm. Composition dolomitic ls, 40% mottles weather out prominently, mottle concentration varies throughout unit, 3 mm 'tubes' on bedding planes (distinct from dolomitic mottles). N16 Sample/Slab Description (taken 1.1 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 20% microspar, 10% spar, 65% evenly distributed f-m xyn dolomite, 5% porosity along stylolites and between xtals. Rock Name: sparry/microsparitic f-m xyn dolostone.

BASE OF UNIT 44.10 TOP OF UNIT 46.00 THICKNESS 1.90

UNIT N17. Weathering Character prom. Colour WS-purplish brown w/ tan mottles. Basal Contact planar abrupt. Bedding Character planar on a large scale, irregular on a small scale. Bed/Lam Thickness min 3 cm, max 30 cm, mode 10 cm. Composition dolostone. N17 Sample/Slab Description fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, composition; 15% mostly dolomitic articulated ostracods (to 1 mm in size), 10% microspar, 3% spar, 62% f m xyn dolomite, 10% interxyn porosity. Rock Name: ostracodal microsparitic f-m xyn dolostone. Misc well indurated.

BASE OF UNIT 46.00 TOP OF UNIT 47.00 THICKNESS 1.00

UNIT N18. Description mottled dolomitic ls.

BASE OF UNIT 47.00 TOP OF UNIT 47.40 THICKNESS 0.40

UNIT N19. Weathering Character prom. Composition calc dolostone as for N17. Sedimentary Structures high-amplitude stylolites.

BASE OF UNIT 47.40 TOP OF UNIT 47.70 THICKNESS 0.30

UNIT N20. Weathering Character semi-prom. Composition complex interbedded ls and dolostone, calc dolostone and dolomitic ls.

BASE OF UNIT 47.70 TOP OF UNIT 49.80 THICKNESS 2.10

UNIT N21. Weathering Character prom overhanging ledge. Colour WS-lt brown w/ rusty buff patches on joint surfaces, FS-lt brown. Basal Contact planar abrupt. Bedding Character 2 cm-sized mottles. Composition dolostone. Misc well indurated. N21 Sample/Slab/Thin Section Description fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; 50% porous irregularly-shaped m xyn dolomite (in mottles) in f xyn dolostone, relict high-amplitude stylolites (to 3 mm), tr vugs are lined w/ limpid dolomite and filled w/ spar, tr limpid dolomite has been replaced by spar. 3% f xyn spar, overall 77% dolomite w/ 20% porosity, but interxyn porosity is 35% in the porous m xyn dolomitic mottles, m xyn dolomite rhombs are com corroded, probably a result of the dissolution of calcified dolomite. CL; dolomite (including limpid vug-lining dolomite) is moderately orange-red luminescent. Zoned orange-luminescent spar fills vugs. Rock Name: mottled f-m xyn dolostone.

BASE OF UNIT 49.80 TOP OF UNIT 54.20 THICKNESS 4.40

R. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION O, MEASURED IN 1984.

Locality: 28.3 km SW of Cape Crauford.

Latitude: 73°32'54"N.

Longitude: 85°24'W.

UNIT O1. Description probably at the same stratigraphic level as L10h, breccia pipes in mottled ls contain clasts of mottled ls 5 mm to 50 cm in size, sharp vertical contact. Clasts of mottled ls contain brachs. Samples O1, O1a of pentamerids and breccia, O1b of flowstone. O1 Sample/Slab Description fresh surface colour; wk vlt yellowish orange (10YR 7/2) and wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, 15% dolomitic mottles (elongate parallel to bedding), composition; tr solitary corals w/ 2 mm diameter calyx, 10% brach frags, 3% favositid corals to 35 mm in size w/ spar-filled corallites, 1% stromatoporoids to 25 mm in size, tr gastropods, 5% ostracod frags, tr ossicles. 66% microspar, 15% f-m xyn dolomite, misc; minor subvertical fractures terminate at stylolites, tr white chert. Rock Name: mottled dolomitic biomicrosparite, locally crackle breccia (1 cm modal clast size). O1a Sample/Slab Description fresh surface colour; mottled wk vlt yellowish orange (10YR 7/2) and wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, 15% f xyn spar (calcified dolomite) mottles, composition; tr ossicles, tr gastropods, 5% brach frags, 3% ostracod frags, tr favositid coral frags. 60% peloids (80µm mode and

composed of microspar), 20% flowstone (spar) to 15 mm wide lines subvertical fractures, single xtals 0.7 mm by 6 mm long, oriented at right angles to the walls of fractures, has banded appearance, 12% microspar. Rock Name: sparry (f xyn) mottled biopelmicrosparite. Ol1b Sample/Slab/Thin Section Description fresh surface colour; overall wk lt olive brown (10YR 6/2), sedimentary structures; breccia, low-amplitude stylolites, calc mottles, composition; 1% ostracods to 1 mm in size, tr ossicles, 25% pentamerid brachs, 2% solitary corals w/ up to 4 mm diameter calyx, 1% stromatoporoids to 10 mm in size, tr favositid coral clasts, tr *Catenipora* frag in clast. 46% peloids (80µm mode, range 75-125µm), 2% chalcedony, some spar in clasts shows cleavage deformation (kinking), 10% f xyn dolomite is concentrated in clasts, extensively calcified dolomite, 13% porosity is distributed as 5% partially dissolved clasts, 5% interxyn porosity, dolomitic clasts have higher porosity because of dissolved calcified dolomite; some clasts are entirely fossils, 'matrix' is very limonitic, max clast size 15 mm, 3 mm mode. Rock Name: dolomitic/microsparitic biopelsparite 'clast'-sparry microsparite 'matrix' rubble breccia.

BASE OF UNIT 0.00 TOP OF UNIT 5.00 THICKNESS 5.00

S. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION P, MEASURED IN 1984.

Locality: 29 km SW of Cape Crauford, approx 300 m west of base camp.

Latitude: 73°32'48"N.

Longitude: 85°23'W.

The upper part of member A of the Baillarge Formation is included in section P.

The base of unit P1 is taken as equivalent to the base of unit N21 and the base of unit L1 is taken as equivalent to section P at 84 m.

UNIT P0. Unit heights given continue on from section N but are not heights asl at section P because of the intervening dip of the strata.

BASE OF UNIT 0.00 TOP OF UNIT 49.80 THICKNESS 49.80

UNIT P1. Weathering Character prom cliff-forming overhanging ledge. Colour WS-buff, FS-lt brown. Basal Contact abrupt, planar. Bedding Character unbedded, but subhorizontal mottles. Composition c xyn dolostone w/ tr chert nodules. Sedimentary Structures 40% mottles. Fossils a 4 cm-wide trilobite pygidium and a gastropod were observed in buff platey ls in scree 4.2 m abu. P1 Sample/Slab Description (taken 4.2 m abu), fresh surface colour; m olive-brown (10YR 5/3), sedimentary structures; tr vugs, composition; 10% f-m xyn spar between 62% f-m xyn dolomite (125µm mode) rhombs, 25% interxyn porosity, 3% vugs to 3 mm in size. Rock Name: mottled sparry f-m xyn dolostone. Pla Scree Sample Description 75 mm diameter planispiral gastropod cf. *Maclurites*.

BASE OF UNIT 49.80 TOP OF UNIT 54.20 THICKNESS 4.40

UNIT P2. Weathering Character semi-prom. Composition dolostone as for unit P1 but sl calc. Bedding Character indistinct mottles and planar irregular bedding. Bed Thickness min 10 cm, max 30 cm, mode 20 cm. Composition dolostone as for P1 but sl calc and bedded. Fossils poorly preserved ossicles.

BASE OF UNIT 54.20 TOP OF UNIT 58.80 THICKNESS 4.60

UNIT P3. Weathering Character semi-prom. Colour WS-buff w/ lt buff mottles, FS-lt to m brown. Basal Contact abrupt, irregular. Bedding Character indistinct planar irregular and mottled. Bed/Lam Thickness min 5 cm, max 20 cm, mode NA. Composition c xyn dolostone. Sedimentary Structures 25% mottles are approx 3 mm in size. P3 Sample/Slab Description (taken 15 cm abu), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; tr ossicles, 10% f xyn spar, 85% f-m xyn dolomite, 5% interxyn porosity. Rock Name: mottled sparry f-m xyn dolostone.

BASE OF UNIT 58.80 TOP OF UNIT 59.35 THICKNESS 0.55

UNIT P4. Weathering Character semi-prom. Colour WS & FS-lt grey. Basal Contact planar abrupt, irreg. Bedding Character planar irregular. Bed/Lam Thickness min 8 cm, max 15 cm, mode 10 cm. Composition dolostone. Sedimentary Structures 15-30% 5 mm diameter mottles. BASE OF UNIT 59.35 TOP OF UNIT 61.00 THICKNESS 1.65

UNIT P5. Weathering Character rec covered interval.
BASE OF UNIT 61.00 TOP OF UNIT 62.00 THICKNESS 1.00

UNIT P6. Weathering Character prom. Colour WS & FS-m brown. Basal Contact covered. Bedding Character planar. Bed/Lam Thickness min 20 cm, max 1.2 m. Composition dolostone as for unit P2, tr chert replaces some mottles. Sedimentary Structures indistinct mottles. Misc white dolomite xtals on joint surfaces. BASE OF UNIT 62.00 TOP OF UNIT 68.30 THICKNESS 6.30

UNIT P7. Weathering Character semi-prom. Colour WS-m brown & buff. FS-m brown & grey. Basal Contact abrupt, planar. Bedding Character planar irregular. Bed/Lam Thickness min 20 cm, max 1 m (for the thick beds), min 5 cm, max 20 cm (for the thin beds). Composition mottled dolostone w/ approx 1% chert nodules, interbedded thick and thin units. Sedimentary Structures high-amplitude stylolites. P7 Sample/Slab Description (rep litho sample taken 5.3 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; 1 mm-sized 'tubes', relict high-amplitude stylolites, some accentuated w/ dk brownish black residue to 0.3 mm thick, composition; 10% ostracod valve ghosts, some to 7 mm long, tr gastropods, tr spar fills vugs, 85% f-m xyn dolomite, 5% interxyn porosity. Rock Name: ostracodal f-m xyn dolostone. P7a Sample/Slab/Thin Section Description (from a 50 cm thick chert bed taken 6.45 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2) and vwv xlt yellowish orange (10YR 8/1) sedimentary structures; low-amplitude stylolites, minor high-amplitude stylolites are accentuated w/ black residue to 125µm thick, composition; 30% ostracod valves (to 1 mm in size) in 50 mm-wide chert nodules, tr spar fills fractures, 25% lt grey aphano/vf xyn chert nodules to 30 mm wide, 25% f xyn dolomite xtals (25µm size mode), most of which are lath-shaped. CL; a moderagely orange-red luminescent dolomite, chert is non-luminescent. FLUOR; minor fluorescent cherty patches. 20% interxyn porosity. Rock Name: chert-nodule-bearing ostracodal f xyn dolostone. BASE OF UNIT 68.30 TOP OF UNIT 75.80 THICKNESS 7.50

Unit 9 immediately overlies unit 7.

UNIT P9. Weathering Character semi-prom. Colour WS-buff, FS-lt brown. Basal Contact planar abrupt, irregular on a cm scale. Bedding Character planar, occasional ripple lam, convex-up structures (70 cm wide and 5 cm high). Bed/Lam Thickness min 10 cm, max 25 cm but variable. Composition dolostone w/ some (<1%) chert nodules, trans to fissile and shaly upwards. Sedimentary Structures approx 3 mm-sized tube-shaped mottles, some bed surfaces are 100% mottled but are variable in different beds. Oscillatory ripple marks w/ 15 cm wavelength and 1 cm amplitude trend approx 80° (plus or minus 15°), <1% vugs are lined w/ carbonate xtals. The chert nodules, which are dk grey and up to 4 cm thick occur at the base of the convex-up structures. Misc extremely coarsely crystalline spar (crystals larger than 1 cm in size) line joints. P9 Sample/Slab Description (taken from ripple interval 11.45 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, planar sl wavy lam, composition; 3% microspar, 82% f-m xyn dolomite, 15% interxyn porosity. Rock Name: f-m xyn dolostone. P9a Sample/Slab/Thin Section Description (black chert nodule taken 9.4 m abu), fresh surface colour; wk xdk olive brown (10YR 2/1), sedimentary structures; chert nodule frag 65 mm long and 27 mm thick (sampled), composition; 5% ostracod frags to 1 mm in size, 5% m xyn spar fills fractures and is in part replaced by dolomite and chert, 50% chert is aphano/vf xyn, misc; banding in chert cross-cuts original lam, 5% f xyn pyrite in chert, a high concentration of subvertical fractures

are filled w/ m xyn spar, 30% evenly distributed vf-f xyn well-developed dolomite rhombs in chert nodule, 5% porosity along fractures. CL; chert is non-luminescent except for 1% moderately blue-luminescent xtals, bright orange-luminescent spar fills fractures. Rock Name: sl sparry/dolomitic/ostracodal aphanite to vf xyn chert nodule. Misc above unit P9 there is a thick grey scree-covered interval.

BASE OF UNIT 75.80 TOP OF UNIT 90.00 THICKNESS 14.20

T. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION Q, MEASURED IN 1984.

Locality: 3.8 km southwest of major stream flowing into Prince Regent Inlet at Peak Valley.

Latitude: 73°30'06"N.

Longitude: 88°05'W.

The base of unit Q2 is taken as the base of the upper member of the Cape Crauford Formation.

The base of Q22 is correlated with the top of R21.

UNIT Q2. Weathering Character starting near base of obvious resistant unit = marker bed at base of cliffs about 106 m asl. Prom cliff-former, distinctive marker bed, 20 m long isolated outcrop. Colour WS-buff w/ dk grey chert, FS-vlt brownish grey w/ dk grey chert. Basal Contact covered. Bedding Character wavy irregular (0.5 m wavelength, 5 cm amplitude), small scale irregular, in part interbedded, locally has some large kink-banded structures and very local breccia (one 15 cm-long contorted and rotated 'clast'). Bed/Lam Thickness min 2 mm, max 30 mm, mode 10 mm. Composition microsparite w/ 1% chert nodules parallel to bedding, minor chert beds, approx 1% breccia. Sedimentary Structures convex-up structures (50 cm wide and 10 cm high), high-amplitude stylolites throughout, brecciated chert beds. Fossils none. Misc chert nodules, max 0.8 m long and 5 cm thick, some fractured and crackle brecciated, locally dipping 4° north. Unit Q1 represents 106 m of unmeasured section. The base of Q2 is near the base of the most obvious resistant unit (marker bed). This section starts at the base of Q2 which is assigned the value 0.00 m. Q2 Sample/Slab Description (of chert nodule), fresh surface colour; wk vlt yellowish orange (10YR 7/2) and vw dk olive brown (10YR 4/1) chert, sedimentary structures; chert nodule 60 mm in size, is fractured and brecciated in places (5% fracture porosity). Rock Name: nodular chert. Sample Q2a taken for conodonts. Q2b Sample/Slab Description fresh surface colour; wk lt olive brown (10YR 6/2) (litho sample of breccia), sedimentary structures; low-amplitude stylolites and minor high-amplitude stylolites are accentuated by dk brown residue, locally brecciated, minor vugs to 5 mm between clasts, dk grey chert nodule (fractured) to 60 mm in size, sl brecciated but there is no ghost breccia texture in the chert. In addition, stylolites skirt the nodule. Locally crackle (stylo-) breccia. In some cases rotated clasts have stylolites developed on their 'ends' which results in stylolites within clasts meeting clast-bounding-stylolites at right angles, composition; 70% microspar, 5% f-c xyn spar fills fractures, misc; extensive subvertical fractures, many of which terminate at stylolites, 15% evenly distributed f xyn dolomite, 10% porosity along stylolites and fractures. Rock Name: sl sparry/dolomitic microsparite (locally crackle or stylo-breccia).

BASE OF UNIT 0.00 TOP OF UNIT 3.00 THICKNESS 3.00

UNIT Q3. Weathering Character rec covered interval.

BASE OF UNIT 3.00 TOP OF UNIT 6.80 THICKNESS 3.80

UNIT Q4. Weathering Character prom. Colour WS-buff, FS-buff to brown. Basal Contact covered. Bedding Character grades up from crackle to mosaic breccia, uniform clast size (1-2 cm mode?) throughout. Composition is clast breccia w/ fractured 3-5% chert nodules, very ang clasts, 70% clasts, 30% 'matrix', low porosity. Sedimentary Structures lam preserved in some originally large clasts, convex-up structures, high-amplitude (to 30 mm) stylolites.

Black chert nodules to 10 cm in size have been brecciated (mosaic breccia). Fossils none. Misc chert nodules show ghost lam. Samples Q4 taken for conodonts.
BASE OF UNIT 6.80 TOP OF UNIT 9.20 THICKNESS 2.40

UNIT Q5. Weathering Character prom. Colour WS and FS-buff. Basal Contact wavy (1 m wavelength, 20 cm amplitude), abrupt. Bedding Character planar. Bed Thickness min 5 cm, max 40 cm, mode 10 cm. Composition dolostone w/ 0.2 mm modal xtal size, calc from 1.6 to 1.7 m abu. Sedimentary Structures low-amplitude stylolites. Fossils a very poorly preserved favositid coral. Samples Q5 taken for conodonts. Q5a Sample/Slab Description (a small litho sample taken 0.8 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low-amplitude stylolites, composition; 3% f xyn spar in lath-shaped xtal aggregates (corroded spar) concentrated along stylolites, 9% f xyn spar, 82% f-m xyn dolomite, 15% interxyn porosity. Rock Name: f-m xyn dolostone.
BASE OF UNIT 9.20 TOP OF UNIT 11.20 THICKNESS 2.00

UNIT Q6. Weathering Character prom, mottles weather out in relief about 1.8 m abu. Colour WS and FS-buff. Basal Contact planar, sl irregular, trans over 5 cm. Bedding Character min 10 cm at base, grading to 1 m about 5 m abu, mottled, the upper 3.3 m of unit is massive. Composition dolostone w/ 0.2-0.3 mm xtal size, sparse fossil content. Sedimentary Structures approx 40% 2-3 cm-long mottles, minor high-amplitude stylolites. Fossils 1% ossicles (3 mm in diameter) are generally poorly preserved, favositid corals to 3 cm in size. Q6 Sample/Slab Description (rep litho sample), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites (but some w/ thick dk brown residue), minor high-amplitude stylolites, composition; 10% ossicles, tr f xyn spar, tr chert, 75% f-m xyn dolomite, 15% interxyn porosity. Rock Name: ossicle-bearing f-m xyn dolostone.
BASE OF UNIT 11.20 TOP OF UNIT 32.20 THICKNESS 21.00

UNIT Q7. Weathering Character prom. Colour WS-buff, FS-lt brownish grey. Basal Contact irregular, trans over 20 cm. Bedding Character very sl-planar bedded. Bed Thickness more than 20 cm. Composition dolostone w/ 0.4 mm-sized xtals, some carb content in irregular wispy lams, approx 25% interxyn porosity, approx 5% vugs (to 1 cm in size). Sedimentary Structures small (approx 4 mm-sized) mottles, ovoid, elongate parallel to bedding from 4.2 to 4.5 m abu, low-amplitude stylolites. Fossils solitary coral 2.5 cm by 1 cm, sl tilted 2.2 m abu, 2% ossicles. Q7 Sample/Slab Description (rep litho sample taken 2.3 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites are accentuated by thick dk brown residue, minor vugs to 5 mm in size, composition; 10% ossicles, tr f xyn spar, 65% f-m xyn dolomite, 20% interxyn porosity, 5% vugs to 1 mm in size. Rock Name: ossicle-bearing f-m xyn dolostone. Q7 Scree Sample Description Q7 contains irregularly-shaped m xyn pyrite aggregates to 30 mm in size many of which have been altered to rusty brown minerals. Q7/8 Sample/Slab Description (sample at 3.2 m abu), fresh surface colour; wk lt olive brown (2.5Y 6/2), sedimentary structures; low-amplitude stylolites, composition; tr ostracods, 90% f-m xyn dolomite, 10% interxyn porosity, misc; minor subvertical fractures. Rock Name: f-m xyn dolostone.
BASE OF UNIT 32.20 TOP OF UNIT 36.70 THICKNESS 4.50

UNIT Q8. Weathering Character prom. Colour WS-buff w/ white mottles, FS-m grey. Basal Contact trans over 5 cm, planar. Bedding Character planar, mottled. Bed Thickness min 3 cm, between 4.6 & 6.3 m abu-min 1-cm, max 20 cm, mode 8 cm. Composition mottled dolostone w/ tr wispy carb films, xtal size approx 0.3 mm, approx 10-15% interxyn porosity, 5% vugs. Sedimentary Structures 2-3 cm-sized mottles, some filled w/ chalky mat'l, low-amplitude stylolites. Fossils one echinoderm stem (10 by 3 mm 1.4 m abu), plicated brachs. Q8 Sample/Slab Description (taken from scree 6.1 m abu), fresh surface colour; wk lt brownish olive (2.5Y 6/2), f-m xyn dolostone w/ 20% porosity, 3% pyrite xtal accumulations to 15 mm in size (pyrite xtal cubes to 1 mm in size). Q8a Sample/Slab Description (of mottled dolostone taken 8.7 m abu), fresh surface colour; wk lt olive brown (2.5Y 6/2), sedimentary structures; low-amplitude stylolites are accentuated by dk brown residue, vugs to 10 mm are

filled w/ m-c xyn spar, composition; 3% ossicles, 1% vug-filling spar, 81% f-m xyn dolomite, 15% interxyn porosity. Rock Name: f-m xyn dolostone.

BASE OF UNIT 36.70 TOP OF UNIT 46.00 THICKNESS 9.30

UNIT Q9. Weathering Character prom. Colour WS-buff, FS-lt brownish grey. Basal Contact planar, sl irregular, very abrupt, intraclastic unit in basal 20 cm. Bedding Character planar to irregular, hummocky on a large scale. Bed Thickness min 2 cm, max 20 cm, mode 5 cm.

Sedimentary Structures mottled, also contains 4 mm diameter 'tubes' and some vugs.

Composition dolostone w/ tr wispy carb films, 0.2 mm xtal size, low porosity. Intraclastic zone is 20 cm thick at base, ungraded and poorly sorted. Intraclasts have a 3 cm maximum size and a 4 mm mode. Sedimentary Structures mottles. Sample Q9 taken at the base of the unit.

BASE OF UNIT 46.00 TOP OF UNIT 49.30 THICKNESS 3.30

UNIT Q10. Weathering Character prom. Colour WS-buff w/ white mottles, FS-m grey. Basal Contact planar, abrupt. Bedding Character mottled. Bed Thickness min 10 cm, max 50 cm.

Sedimentary Structures mottles, vugs after some mottles are filled w/ pyrite. Composition mottled sl calc dolostone is very similar to unit Q8 except for <1% pyrite cubes (and oxidized pyritic minerals to 1 cm in size in vugs formed in the lt coloured mottles), pyritic zone is approx 0.5 m thick between 1.7 and 2.2 m abu. Sedimentary Structures mottles as for Q8.

Fossils a favositid coral 0.5 m abu and a 2 cm-long solitary coral (on its side) 0.7 m abu. Q10

Sample/Slab Description (taken 1.9 m abu), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; low-amplitude stylolites, 5% vugs to 15 mm in size are filled w/ f xyn pyrite xtal aggregates, composition; 3% c xyn spar fills subvertical fractures, 77% f-m xyn dolomite, 15% interxyn porosity, 5% vugs, misc; subvertical fractures, a 1 mm thick rim of rust-coloured weathered pyrite lines vugs. Rock Name: f-m xyn dolostone. Q10a

Sample/Slab Description (of solitary coral), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; low-amplitude stylolites, one vug to 20 mm in size is lined w/ m to extremely c xyn spar, composition; 20% ossicles, one 5 mm-sized articulated ostracod, 5% spar between dolomite rhombs, 55% f-m xyn dolomite, 20% interxyn porosity. Rock Name: sl sparry/ossicle-rich f-m xyn dolostone. Q10b Sample/Slab/Thin Section Description (of pyritic zone), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; low-amplitude stylolites, 5% vugs to 20 mm in size, composition; 5% ossicles, 3% f-m xyn spar along stylolites and fractures, 5% pyrite xtals to 1.5 mm in size, 67% m xyn dolomite (75µm mode) w/ anhedral intergrown texture, larger dolomite rhombs have clear rims and cloudy cores and are com leached (some leaching as porous 'rims' inside xtal boundaries), 15% porosity between and in xtals. CL; dolomite luminesces a moderate orange and pyrite is non-luminescent. Rock Name: sl pyritic ossicle-bearing m xyn dolostone.

BASE OF UNIT 49.30 TOP OF UNIT 52.20 THICKNESS 2.90

UNIT Q11. Weathering Character prom. Colour WS-buff, FS-lt brownish grey. Basal Contact planar irregular, trans over 10 cm. Bedding Character hummocky (7 cm wavelength and 1.5 cm amplitude). Bed Parting Thickness min 2 cm, max 10 cm. Composition dolostone w/ 0.2 mm xtal size. Sedimentary Structures convex-up and hummocky structures, tr cross-stratification(?). Q11 Sample/Slab Description (taken 30 cm abu), fresh surface colour; wk xlt yellowish orange (2.5Y 8/2), sedimentary structures; wavy lam, hummocky (30 mm amplitude and 55 mm wavelength), composition; 3% f-m xyn spar between dolomite, 77% f-m xyn dolomite, 20% interxyn porosity. Rock Name: f-m xyn dolostone.

BASE OF UNIT 52.20 TOP OF UNIT 53.10 THICKNESS 0.90

UNIT Q12. Weathering Character prom. Colour WS & FS-as for Q11. Basal Contact abrupt, planar. Bedding Character planar. Composition mottled dolostone as for Q8 but sl calc.

BASE OF UNIT 53.10 TOP OF UNIT 54.40 THICKNESS 1.30

UNIT Q13. Weathering Character prom. Bed/Lam Thickness approx 1 cm. Composition dolostone as for Q9 w/ tr chert nodules 1.8 m abu, locally brecciated (a 50 cm-wide breccia

pipe in which the breccia extends to various levels to cross-cut the planar beds of unit Q14). Sedimentary Structures planar lam, sl wavy, 1.0 m abu becomes fissile, tr dk grey chert nodules 1.8 m abu. Convex-up structures (15 cm wavelength, 2 cm amplitude). The breccia pipe is bounded laterally by subvertical joints and above by unit Q14, 'clasts' are indistinct and have a 2 cm modal size.

BASE OF UNIT 54.40 TOP OF UNIT 57.00 THICKNESS 2.60

UNIT Q14. Weathering Character prom. Colour WS-buff. Basal Contact sl irregular and abrupt. Bedding Character sl mottled. Composition mainly c xyn dolostone w/ vugs elongate parallel to bedding, dolostone clast breccia occurs locally. Convex-up structures occur in calc dolostone 1.0 m abu. Some pyrolusite(?) staining. Oddly, the composition is ls above the breccia pipe of unit Q13. Sedimentary Structures convex-up structures 1.0 m abu, there is a 5 cm thick stylolitic zone at the base of the convex-up structures. Misc ls occurs above breccia pipes. Q14 Sample/Slab Description fresh surface colour; wk m brownish olive (2.5Y 5/2), sedimentary structures; low-amplitude stylolites, minor vugs to 5 mm in size, composition; 20% f-m xyn spar, 60% m xyn dolomite (125 μ m mode) w/ anhedral intergrown texture, 20% interxyn porosity. Rock Name: sparry m xyn dolostone. Sample Q14a taken for conodonts. Q14b Sample/Slab Description (fissile convex-up structures above the stylolitic ls zone), fresh surface colour; wk lt olive-brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 80% f-m xyn dolomite w/ intergrown anhedral xtal texture, 20% interxyn porosity. Rock Name: f-m xyn dolostone.

BASE OF UNIT 57.00 TOP OF UNIT 57.60 THICKNESS 0.60

UNIT Q15. Weathering Character prom. Colour WS-lt buff, FS-brownish buff. Basal Contact trans over 10 cm, sl wavy. Bedding Character indistinct but wavy at base, trans to planar upward. Bed Thickness min 3 cm, max 25 cm, mode 4 cm, very vaguely lam. Composition dolostone. Sedimentary Structures a few small vugs. Q15 Sample/Slab Description (taken 0.7 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; low-amplitude stylolites, composition; 85% m xyn dolomite (75 μ m mode), 15% porosity. Rock Name: m xyn dolostone.

BASE OF UNIT 57.60 TOP OF UNIT 58.70 THICKNESS 1.10

UNIT Q16. Weathering Character prom. Colour WS-buff w/ white mottles, FS-m grey. Bedding Character mottled. Composition mottled dolostone as for Q8. Fossils stromatoporoids (sl calc) and a solitary coral.

BASE OF UNIT 58.70 TOP OF UNIT 59.20 THICKNESS 0.50

UNIT Q17. Weathering Character prom. Colour WS-buff, FS-lt brownish grey w/ dk grey blebs. Basal Contact trans, planar over 10 cm. Bedding Character poorly defined, almost massive. Bed Thickness min 1 cm, max 8 cm, mode 2-3 cm. Composition dolostone. Sedimentary Structures poorly defined wispy 'ghost' mottles. Q17 Sample/Slab Description (rep litho sample), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; very vague planar bedding, composition; 1% m xyn spar in patches to 5 mm in size, 5% f xyn pyrite accumulations to 1 mm in size, 79% f xyn dolomite (25 μ m mode), 15% interxyn porosity. Rock Name: sl pyritic/f xyn dolostone.

BASE OF UNIT 59.20 TOP OF UNIT 59.65 THICKNESS 0.45

UNIT Q18. Weathering Character semi-prom. Colour WS-buff, FS-lt brown. Basal Contact abrupt, planar irregular. Bedding Character indistinctly planar. Bed Parting Thickness min 2 cm, max 15 cm. Composition dolostone. Misc conchoidal fractures. Q18 Sample/Slab Description (taken 30 cm abu), fresh surface colour; wk lt brownish olive (2.5Y 6/2), sedimentary structures; planar wavy lam, composition; 85% f-m xyn dolomite (50 μ m mode), 15% interxyn porosity. Rock Name: f-m xyn dolostone.

BASE OF UNIT 59.65 TOP OF UNIT 60.50 THICKNESS 0.85

UNIT Q19. Weathering Character prom. Colour WS-buff, FS-lt brown. Basal Contact

irregular, trans over 15 cm. Bedding Character irregular. Composition dolostone (sl calc in locally brecciated areas) w/ an approx 1 cm modal clast size.

BASE OF UNIT 60.50 TOP OF UNIT 61.00 THICKNESS 0.50

UNIT Q20. Weathering Character semi-rec, partially covered and conchoidally fractured. Colour WS-vlt buff, FS-sl brownish grey. Basal Contact planar irregular, abrupt. Bedding Character planar, indistinct. Composition dolostone w/ occasional fluorite on bedding planes. Q20 Scree Sample Description (contains fluorite on bedding plane surfaces), fresh surface colour; vlt orangy yellow (2.5Y 7/3) w/ approx 3% purple f xyn fluorite as xtal aggregates and tr pyrite xtals to 1 mm in size.

BASE OF UNIT 61.00 TOP OF UNIT 64.70 THICKNESS 3.70

UNIT Q21. Weathering Character prom, well indurated. Colour WS and FS-buff. Basal Contact abrupt, convex-up structures (60 cm wavelength, 20 cm amplitude). Bedding Character mottled, irregular, locally brecciated near the base w/ irregularly-shaped convex-up structures (to 25 cm wide & 4 cm high) overlying the breccia. Bed Thickness min 4 cm, max 0.8 m, mode NA. Composition mottled dolostone, sl fossiliferous (at most 5% fossils) and locally sl calc, local minor breccia w/ 1 cm-sized clasts especially at the base, 5% vugs. Chert nodules at base, some pyrite staining, breccia in basal 40 cm. Sedimentary Structures mottles. Fossils 'ghosts' of favositid corals and stromatoporoids. Q21 Sample/Slab Description (taken of breccia), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; low-amplitude wavy stylolites, composition; 85% f xyn dolomite (30µm mode) w/ 15% interxyn porosity. Rock Name: f xyn dolostone.

BASE OF UNIT 64.70 TOP OF UNIT 65.50 THICKNESS 0.80

UNIT Q22. Weathering Character prom. Colour WS-buff, FS-lt brown. Basal Contact trans over 1 m, planar, sl irregular. Bedding Character indistinct, planar irregular w/ 'ghost' mottles. Bed Parting Thickness min 5 cm, max 50 cm, mode 20 cm. Composition mottled dolostone, 2% vugs, circular concretions approx 5 cm in size, very faint mottles on WS. From 5.5 to 6.5 m abu there is a partly covered breccia pipe (more than 3 m wide). Modal clast size is 1 cm. Stylolites occur in adjacent dolostone. 9.5 m abu there is a small plateau, the upper 2 m of which weathers platey. Recent(?) calcified dolomite occurs in the weathered upper part of the unit. Sedimentary Structures 5-10 cm-sized brown-rimmed concretions (altered mottles) have chalky white interiors. High-amplitude stylolites are com. Fossils one ossicle. Misc well indurated. Q22 Sample/Slab Description (taken 3.5 m abu, contains a concretion), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; wavy stylolites, minor vugs to 300µm in size, composition; 5% ossicles, 75% f-m xyn dolomite (75µm mode), 20% interxyn porosity. Rock Name: f-m xyn dolostone. Q22a Sample/Slab/Thin Section Description (rep litho sample taken), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; minor scouring, composition; 5% f xyn spar between dolomite rhombs, 75% f-m xyn dolomite (50µm-sized). The dolomite is extensively corroded with spar replacing xtal edges, 20% interxyn porosity. CL; a uniform dull orange-red luminescent dolomite, spar between dolomite is non-luminescent. Rock Name: sl sparry/f-m xyn dolostone (depositionally an interlam c dololite-vf dolarenite).

BASE OF UNIT 65.50 TOP OF UNIT 75.00 THICKNESS 9.50

UNIT Q23. Weathering Character rec covered interval.

BASE OF UNIT 75.00 TOP OF UNIT 76.50 THICKNESS 1.50

UNIT Q24. Weathering Character prom. Description lam dolostone.

BASE OF UNIT 76.50 TOP OF UNIT 77.00 THICKNESS 0.50

UNIT Q25. Weathering Character prom. Colour WS-buff, FS-lt brown. Basal Contact abrupt, planar. Bedding Character indistinct, tr planar irregular, almost massive. Composition mottled dolostone, concretions w/ chalky white interiors. Sedimentary Structures circular white concretions (altered mottles).

BASE OF UNIT 77.00 TOP OF UNIT 77.50 THICKNESS 0.50

UNIT Q26. Weathering Character prom. Description lam dolostone.
BASE OF UNIT 77.50 TOP OF UNIT 77.90 THICKNESS 0.40

UNIT Q27. Weathering Character prom. Colour WS-buff, FS-lt brown. Basal Contact planar abrupt. Bedding Character indistinctly mottled. Composition dolostone.
BASE OF UNIT 77.90 TOP OF UNIT 79.20 THICKNESS 1.30

UNIT Q28. Weathering Character prom. Desc lam dolostone.
BASE OF UNIT 79.20 TOP OF UNIT 79.60 THICKNESS 0.40

UNIT Q29. Weathering Character prom. Description massive buff dolostone. Q29
Sample/Slab Description (rep litho sample taken 0.6 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), composition; f xyn dolomite (50 μ m mode), 15% interxyn porosity. Rock Name: f xyn dolostone.
BASE OF UNIT 79.60 TOP OF UNIT 80.20 THICKNESS 0.60

UNIT Q30. Weathering Character prom. Colour WS & FS-buff. Composition mottled dolostone as for Q22 w/ some deformation (dissolution) structures at the base, locally brecciated. Misc reached top approx 1.8 m abu, travelled 50 m north to next buttress-like outcrop where the unit is a small breccia pipe. This breccia pipe is overlain by massive dolostone containing faint convex-up structures (10 cm wide and 1 cm high). Clasts of dolomitic ls are of various sizes and have been deformed (clast mode is 2 cm and ranges to 15 cm).
BASE OF UNIT 80.20 TOP OF UNIT 82.60 THICKNESS 2.40

UNIT Q31. Weathering Character prom. Composition massive buff dolostone w/ discontinuous black lams. Sedimentary Structures lams form convex-up structures (wavelength 20 cm, amplitude 5 cm) at the base of the unit where it overlies the breccia pipes. Q31
Sample/Slab Description (rep litho sample taken 0.7 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; 'ghost' deformation structures, composition; 2% f xyn pyrite xtal accumulations, 78% f xyn dolomite (25 μ m mode), intergrown anhedral texture, 20% interxyn porosity. Rock Name: f xyn dolostone.
BASE OF UNIT 82.60 TOP OF UNIT 84.10 THICKNESS 1.50

UNIT Q32. Weathering Character prom. Composition mottled dolostone w/ breccia in basal 40 cm. Fossils chain and favositid corals.
BASE OF UNIT 84.10 TOP OF UNIT 85.00 THICKNESS 0.90

UNIT Q33. Weathering Character prom. Composition lam dolostone (the basal 40 cm is locally brecciated and the upper 30 cm is massive).
BASE OF UNIT 85.00 TOP OF UNIT 85.80 THICKNESS 0.80

UNIT Q34. Weathering Character prom. Composition mottled dolostone.
BASE OF UNIT 85.80 TOP OF UNIT 88.50 THICKNESS 2.70

UNIT Q35. Weathering Character rec covered interval.
BASE OF UNIT 88.50 TOP OF UNIT 98.50 THICKNESS 10.00

U. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION R, MEASURED IN 1984.

Locality: Coastal cliffs 1.7 km SW of the stream that flows into Prince Regent Inlet at Peak Valley.

Latitude: 73°39'06"N.

Longitude: 87°58'W.

Section R was measured within the lower member of the Cape Crauford Formation. The top of R21 is taken as the top of the lower member and correlates w/ the base of Q2. Sealevel is taken to coincide with the base of unit R1.

UNIT R1. Weathering Character rec, covered by ice and gravel near sealevel.

BASE OF UNIT 0.00 TOP OF UNIT 1.40 THICKNESS 1.40

UNIT R2. Weathering Character semi-rec. Colour WS and FS-interlam dk brown and vdk grey. Basal Contact covered. Bedding Character planar lam, locally contorted (irregular convex-up structures). Bed/Lam Thickness 5-10 mm thick dk grey and brown lams, upper 0.5 m is unlam, 20 cm bed parting thickness. Composition mottled dolostone w/ carb lams, xtal size 0.1 mm, locally brecciated (1 cm modal clast size). Sedimentary Structures contorted lam near top of unit, tr high-amplitude stylolites. R2 Sample/Slab Description (rep litho sample taken 1.2 m abu), fresh surface colour; interlam wk vlt orangy yellow (2.5Y 7/2) and wk dk brownish olive (2.5Y 4/2), sedimentary structures; low-amplitude and tr high-amplitude stylolites, planar to sl wavy lam w/ black (carb?) films, composition; 85% f xyn dolomite (25 μ m mode), 15% interxyn porosity. Rock Name: f xyn dolostone.

BASE OF UNIT 1.40 TOP OF UNIT 3.70 THICKNESS 2.30

UNIT R3. Weathering Character semi-rec. Colour WS-overall buff, FS-lt brown. Basal Contact abrupt, convex-up structures. Composition dolostone and ls rubble breccia, matrix is more calc than buff clasts, 60% 'clasts', 30% 'matrix' and 10% interxyn porosity. Clasts range from 1 mm to 30 cm in size, are ang to sbang, randomly oriented and are larger approx 1.2 m abu (inversely graded). Some of the larger clasts are deformed or faulted. Sedimentary Structures some clasts are planar lam and are derived from the overlying unit. R3 Sample/Slab/Thin Section Description (rep litho sample taken 20 cm abu), fresh surface colour; overall wk vlt orangy-yellow (2.5Y 7/2), sedimentary structures; breccia w/ dk residue com at clast boundaries, low-amplitude stylolites, composition; breccia, clast size ranges from 2 to 23 mm (mode 8 mm), clasts are vf-f xyn dolostone w/ 5% chert clasts, 40% 'matrix' consists of 5% f xyn spar and 35% vf-f xyn dolomite, misc; subvertical fractures are com in some of the clasts. Most of the dolomite rhombs are lath-shaped. CL; dull orange-red luminescent dolomite, minor non-luminescent vug-filling spar. Rock Name: m calcirudite-sized breccia: vf-f xyn dolostone 'clast'-sparry f xyn dolomitic 'matrix' rubble breccia (in part crackle or stylo-breccia). Sample R3a taken for conodonts.

BASE OF UNIT 3.70 TOP OF UNIT 4.80 THICKNESS 1.10

UNIT R4. Weathering Character semi-rec. Colour WS-buff, FS-m brown. Basal Contact irregular, partly collapsed into the underlying unit R3. Bedding Character planar lams at base, massive in upper 0.8 m. Bed/Lam Thickness min 2 mm, max 1 cm, mode 5 mm in the basal 30 cm. Where deformation occurs bed thickness becomes parting thickness. Composition f xyn dolostone, in part calc, low porosity, locally brecciated at the base of the unit. Sedimentary Structures massive in upper 0.8 m. Misc conchoidally fractured into clasts approx 20 cm in size. R4 Sample/Slab Description (rep litho sample taken 30 cm abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; vague planar to sl irregular lam, composition; 80% f xyn dolomite (30 μ m mode), 20% interxyn porosity, Rock Name: f xyn dolostone.

BASE OF UNIT 4.80 TOP OF UNIT 5.90 THICKNESS 1.10

UNIT R5. Weathering Character semi-prom. Colour WS-m brown w/ buff mottles, FS-dk brown w/ buff mottles. There is a peculiar dk grey discordant zone to 10 cm thick immediately underlying the breccia. Basal Contact abrupt, irregular, breccia extends down to various levels in the underlying unit R4. Bedding Character massive, inversely-graded breccia (1 cm-sized clasts at the base grade to 10 cm-sized clasts 40 cm abu). Composition ls breccia.

Sedimentary Structures high-amplitude columnar stylolites. Misc thickness of unit is laterally variable. R5 Sample/Slab Description (contains stylolites 0.5 m abu), fresh surface colour; mottled wk m olive brown (10YR 4/2) and wk xlt yellowish orange (10YR 8/2), sedimentary structures; high-amplitude (to many cm) pervasive stylolites, locally crackle (stylo-) breccia, stylolites are accentuated by black residue 25 μ m thick, f xyn spar which resembles flowstone and is 2 cm thick lines vugs, some stylolites cross-cut the 'flowstone', composition; 78% f xyn spar, 2% chert, 5% f xyn dolomite, 15% porosity along fractures/stylolites and between xtals, locally stylo-breccia 'clasts' are difficult to distinguish from 'matrix'. Rock Name: f xyn sparite 'clast and matrix' crackle (stylo-) breccia.

BASE OF UNIT 5.90 TOP OF UNIT 7.00 THICKNESS 1.10

UNIT R6. Weathering Character semi-prom, extremely fractured. Colour WS-lt buff, FS-lt brown. Basal Contact irregular and abrupt. Bedding Character breccia. Composition ls breccia w/ clasts from overlying unit in uppermost 0.4 m, clast size to 5 cm but w/ a 1-2 cm mode. Sedimentary Structures high-amplitude (to several cm) columnar stylolites. R6 Sample/Slab Description (taken 1.1 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; breccia, low-amplitude stylolites com form the contacts between clasts, there are also high-amplitude (to at least 8 mm) stylolites accentuated by black residue to 200 μ m thick, composition; 1% white chert (some alongside high-amplitude stylolites), 'matrix' is composed of microsparite/f xyn sparite, 5% interxyn porosity occurs along stylolites and between clasts and xtals, clast size min 2, max 30, mode 10 mm, 'clasts' are sbang-sbrd and are composed of microsparite/f xyn sparite. Rock Name: m calcirudite-sized breccia; microsparite/f xyn sparite 'clast and matrix' crackle (stylo-) breccia.

BASE OF UNIT 7.00 TOP OF UNIT 8.40 THICKNESS 1.40

UNIT R7. Weathering Character semi-prom. Colour WS-m brownish grey, FS-m brown. Basal Contact irregular, in places collapsed into R6. Bedding Character obscured by high-amplitude stylolites, locally crackle to mosaic breccia. Composition f xyn ls, local crackle to mosaic breccia approx 0.5 m thick. Sedimentary Structures high-amplitude stylolites are accentuated by black residue.

BASE OF UNIT 8.40 TOP OF UNIT 9.40 THICKNESS 1.00

UNIT R8. Weathering Character prom. Colour WS-lt buff, FS-lt brown. Basal Contact abrupt, hummocky (12 cm wide and 3 cm high). Bedding Character breccia. Composition clast-supported inversely-graded ls breccia, approx 80% clasts have a 3 cm mode, still breccia 13 m abu. Misc clast size varies both laterally and vertically, some 2 m square areas contain 2 cm-sized clasts whereas in adjacent areas clasts may range to 40 cm. R8 Sample/Slab/Thin Section Description (contains high-amplitude stylolites 8.8 m abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; high-amplitude (to 8 mm) columnar stylolites are accentuated by black residue to 200 μ m thick, stylolitic residue forms boundaries between clasts, composition; 2% white chert occurs alongside stylolites, 'clasts' and 'matrix' are difficult to distinguish, 'clast' size min 2 mm, max 12 mm, mode 6 mm. Clasts are composed of microsparitic f-m xyn sparite (w/ a clotted texture), 25% porosity between clasts, along stylolites and between xtals. In addition, vugs to 0.5 mm in size are present within the clasts, misc; subvertical fractures terminate at stylolites. The stylolitic top and bottom boundaries of clasts have more residue than the clast sides. CL; entirely non-luminescent. Rock Name: m calcirudite-sized breccia; sparite 'clast and matrix' crackle (stylo-) breccia. Sample R8a taken for conodonts.

BASE OF UNIT 9.40 TOP OF UNIT 26.60 THICKNESS 18.20

UNIT R9. Weathering Character prom, fractured, blocky. Colour WS & FS m brownish grey. Basal Contact planar, abrupt. Bedding Character planar irregular. Bed Thickness min 2 cm, max 30 cm, mode 3-4 cm. Composition intraclastic ls, 60% intraclasts are larger than 1 mm, (mode 3 mm, max 2 cm), not size graded. R9 Sample/Slab Description (taken 3.2 m abu), fresh surface colour; wk dk olive-brown (10YR 4/2), sedimentary structures; low-amplitude stylolites, composition; 5% ostracods to 1 mm in size, 10% micrite, 45% microspar, 35% f xyn

dolomite, some lams more dolomitic than others, 5% porosity along stylolites and between xtals. Rock Name: micritic/dolomitic (f xyn) ostacod-bearing microsparite.
BASE OF UNIT 26.60 TOP OF UNIT 29.80 THICKNESS 3.20

UNIT R10. Weathering Character prom, rubbly. Colour WS-lt buff, FS-lt brown. Basal Contact planar abrupt, variable, deformed in places. Bedding Character breccia. Composition mainly of ls breccia, dolomitic, clast size uniform throughout unit, ungraded, min 1 mm, max 10 cm, mode 1 cm, low porosity, 80% clasts. Misc well indurated, tr ang dk brown chert clasts. R10 Sample/Slab/Thin Section Description (taken 1.0 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2) 'clasts' in a wk lt olive brown (10YR 6/2) 'matrix', sedimentary structures; low-amplitude stylolites. The upper and lower boundaries of the breccia clasts are stylolitic and are accentuated by brown residue, stylolites are most com between microsparite/sparite 'matrix' and dolostone 'clasts', composition; breccia (65% clasts are larger than 2 mm), max size 20 mm, mode 10 mm, 60% of the clasts are composed of vf to f xyn dolostone w/ up to 15% porosity, 5% clasts are chert, 'matrix' consists of dolomitic (f xyn) microsparite/f xyn sparite (mode 20µm) w/ low porosity, misc; very extensive calcification of dolomite, dolostone clasts contain calcified dolomite (partly and completely leached), overall 10% porosity along stylolites and between xtals in the breccia clasts, porosity in dolostone clasts reaches 40% and may have formed upon dissolution of calcified dolomite. CL; entirely non-luminescent. Rock Name: m calcirudite-sized breccia; vf and f xyn dolostone and minor chert 'clast'-dolomitic (f xyn) microsparite/f xyn sparite 'matrix' crackle (stylo-) breccia (possibly a pseudobreccia).
BASE OF UNIT 29.80 TOP OF UNIT 31.00 THICKNESS 1.20

UNIT R11. Weathering Character a rec covered interval forms the top of weathered buttress-shaped outcrops.
BASE OF UNIT 31.00 TOP OF UNIT 33.80 THICKNESS 2.80

UNIT R12. Weathering Character semi-rec, partly covered. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character planar. Bed Thickness approx 10 cm. Composition ls w/ tr wispy discontinuous carb lams. Fossils solitary coral, 1% brachs. R12 Sample/Slab Description fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 1% ossicles (some w/ 5-rayed star-shaped axial canals), 3% solitary corals (one is 18 mm long), 20% stromatoporoids (some bulbous to 16 mm in diameter, one tabular specimen is 100 mm wide), 15% undifferentiated shell frags. 33% peloids (composed of microspar) have a 200µm modal size and range from 50 to 300µm). 10% microspar and 10% spar occur between peloids, 3% vf xyn dolomite, 5% interxyn porosity. Rock Name: sparry biopelmicrosparite.
BASE OF UNIT 33.80 TOP OF UNIT 34.80 THICKNESS 1.00

UNIT R13. Weathering Character rec covered interval between shoreline bluffs and the main cliffs farther from the coast.
BASE OF UNIT 34.80 TOP OF UNIT 84.50 THICKNESS 49.70

UNIT R14. Weathering Character semi-prom. Colour WS & FS-m brownish grey. Basal Contact covered. Bedding Character planar indistinct. Bed Thickness mode 20 cm. Composition f xyn ls w/ tr carb films, small scale wavy lams (2 cm wavelength) w/ stylolites 20 cm abu. Sedimentary Structures high-amplitude stylolites. R14 Sample/Slab Description (rep litho sample taken 30 cm abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low- and high-amplitude (to 2 mm) stylolites, there are also structures that resemble flowstone, composition; tr ostracods to 2.5 mm in size, tr plicated brach frags. 20% peloids and peloid aggregates are composed of microspar. 45% microspar between peloids, 20% f xyn spar, 5% f xyn dolomite (20µm mode), 10% porosity along stylolites and between xtals. Rock Name: sl dolomitic/sparry pelmicrosparite. Sample R14a taken for conodonts. R14b Sample/Slab Description (rep litho sample), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low- and minor high-amplitude

stylolites, wavy lams. composition; 75% microspar, 10% spar along subvertical fractures, 10% evenly distributed f xyn dolomite, 5% porosity along stylolites and between xtals. Rock Name: dolomitic/sparry microsparite.

BASE OF UNIT 84.50 TOP OF UNIT 85.60 THICKNESS 1.10

UNIT R15. Weathering Character semi-prom, fractured. Colour WS & FS-m brownish grey, mottled. Basal Contact trans over 5 cm, planar, sl wavy. Bedding Character mottled, locally brecciated. Bed Parting Thickness mode 10 cm, variable. Composition ls w/ tr irregular black carb films. Sedimentary Structures high-amplitude stylolites and 1 to 2 cm-sized mottles. R15 Sample/Slab Description (rep litho sample taken 40 cm abu), fresh surface colour; wk lt olive brown (10YR 6/2), sedimentary structures; high-amplitude (to 2.5 mm) stylolites, in part crackle (stylo-) breccia, spar has dissolved adjacent to stylolites to form irregularly-shaped vugs to 10 mm in size, composition; tr articulated brachs to 7.5 mm long, 1% articulated ostracods to 4 mm in size. 51% peloid aggregates to 400µm in size are composed of microspar, 15% clear spar between peloid aggregates, 3% f xyn dolomite, 30% porosity along stylolites, between clasts and between xtals/gns. Rock Name: pelsparite, locally crackle (stylo-) breccia.

BASE OF UNIT 85.60 TOP OF UNIT 87.70 THICKNESS 2.10

UNIT R16. Weathering Character rec covered interval.

BASE OF UNIT 87.70 TOP OF UNIT 89.70 THICKNESS 2.00

UNIT R17. Weathering Character semi-prom. Colour WS-lt brownish grey, FS-lt buff. Basal Contact covered. Bedding Character basal 0.5 m is planar, upper part is wavy, lam, locally brecciated. Bed Parting Thickness 8 cm. Composition ls, locally dolomitic w/ 2-5% dk grey/black chert nodules, locally brecciated, nodules are sometimes elongate subparallel to bedding and in some cases brecciated (dk grey to black ang chert clasts) as are lams. Sedimentary Structures contorted lam and high-amplitude stylolites. R17 Sample/Slab Description (rep litho sample taken 2.0 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; high-amplitude stylolites form clast boundaries, composition; breccia, 60% of the clasts are larger than 2 mm (max size 25 mm, mode 10 mm), 'clasts' are composed of dolomitic microsparite/f xyn sparite, 'matrix' is f-c xyn sparite, 25% porosity along 'clast' boundaries, stylolites, between xtals and in partially dissolved clasts (vugs), overall 10% f xyn dolomite. Rock Name: m calcirudite-sized breccia; microsparite-f xyn sparite 'clast' f-c xyn sparite 'matrix' crackle to mosaic breccia. R17a Sample/Slab/Thin Section Description (taken 1.5 m abu), fresh surface colour; wk vlt yellowish orange (10YR 7/2) w/ wk vdk olive brown (10YR 3/1) chert clasts, composition; breccia w/ 70% 'clasts' (larger than 2 mm) in size, max size 20 mm, mode 6 mm, 'clasts' are composed of vf-f (25µm mode) xyn dolostone (60%) and dk grey chert (10%), 'clasts' occur in a f xyn sparite 'matrix'. Sparite of 'matrix' com replaces dolomite rhomb xtal edges, 10% microspar/f xyn spar between dolomite, chert clasts are composed of aphano/vf xyn quartz, 25% overall interxyn porosity. CL; non-luminescent chert, spar luminesces a dull orange and dolomite is non-luminescent. Rock Name: m calcirudite-sized breccia; vf-f xyn dolostone and dk grey chert 'clasts' in sparry f xyn dolostone 'matrix'. R17b Sample/Slab Description (taken 4.0 m abu), fresh surface colour; wk vlt orangy yellow (2.5Y 7/2), sedimentary structures; low-angle planar cross-stratification (35 mm thick cosets), gns within cosets are normally graded. composition; 15% of gns are composed of f xyn spar, tr pyrite, m dololutite-c dolarenite gns are now overgrown/recrystallized and are composed of vf-f xyn dolomite, 25% interxyn porosity. Rock Name: cross-stratified m sparry dololutite-c dolarenite.

BASE OF UNIT 89.70 TOP OF UNIT 93.90 THICKNESS 4.20

UNIT R18. Weathering Character prom, ang blocky weathering. Colour WS & FS-m brown. Basal Contact planar abrupt, small scale irregular, R18 is collapsed into R17. Bedding Character generally massive w/ faint planar beds. Composition fossiliferous ls w/ tr chert nodules to 10 by 4 cm (elongate parallel to bedding). Fossils 25%, in basal 1 m only, brachs (approx 1 cm-sized, articulated, thin-shelled, biconvex, plicated rhynchonellid-type), favositid

coral (approx 2 by 4 cm) 1 m abu, one approx 2 cm-sized overturned solitary coral. R18 Sample/Slab Description (rep litho sample taken 0.9 m abu), fresh surface colour; wk m olive brown (10YR 5/2), sedimentary structures; low-amplitude stylolites, composition; 5% plicated articulated brachs to 6 mm in size are filled w/ pelspar (one contains pelmicrospar), in part silicified valves, 10% brach frags, 5% articulated and disarticulated ostracods, one tabular stromatoporoid (2%) is 3 mm thick and 20 mm wide. 33% 150-200 μ m-sized peloids, 15% microspar and 10% f xyn spar between peloids, 10% vf-f xyn dolomite, 10% porosity along stylolites and between xtals. Rock Name: sparry/dolomitic brachiopodal biopelmicrosparite. R18a Sample Description (taken of solitary coral 1.0 m abu), fresh surface colour; wk m olive brown (10YR 5/2), composition; a solitary coral frag 2 cm long w/ a 1 cm diameter calyx and many septa. Sample R18b taken for conodonts.

BASE OF UNIT 93.90 TOP OF UNIT 107.70 THICKNESS 16.60

UNIT R19. Desc ls as for R18 but weathers buff and bedding (mode 7 cm thick) is better defined.

BASE OF UNIT 107.70 TOP OF UNIT 108.70 THICKNESS 1.00

UNIT R20. Weathering Character rec covered interval.

BASE OF UNIT 108.70 TOP OF UNIT 110.00 THICKNESS 1.30

UNIT R21. Weathering Character prom. Colour WS-buff & m brown, FS-lt to m brown. Basal Contact covered. Bedding Character inversely-graded rubble breccia. Composition ls breccia w/ dk grey brecciated chert nodules, clasts in the basal 30 cm are 1-2 cm in size and grade rapidly up to 10 or more cm about 0.5 m abu. Misc clasts are deformed in wavy beds. BASE OF UNIT 110.00 TOP OF UNIT 111.50 THICKNESS 1.50

V. FIELD AND SAMPLE DESCRIPTIONS FOR SECTION S, DESCRIBED IN 1984.

Locality: North side of stream 4.3 km NE of Peak Valley base camp, 0.8 km from coast.

Latitude: 73°42'N.

Longitude: 87°50'W.

Note: A section was not measured here but lateral changes in the cliff were described. This section is probably stratigraphically equivalent with unit R2.

S1 Sample/Slab Description (rep litho sample from buff breccia), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; breccia, low-amplitude stylolites form the boundaries between clasts, composition; breccia, 70% clasts (min 2 mm, max 50 mm, mode 10 mm) are composed of f xyn dolostone and sparry f xyn dolostone w/ minor dolomitic f xyn sparite, 30% 'matrix' consists of sparry f xyn dolostone. Porosity between clasts and xtals is 25%. Rock Name: m calcirudite-sized breccia: f xyn dolostone and sparry f xyn dolostone 'clast'-dolomitic f xyn sparite 'matrix' breccia. S2 Sample/Slab Description (taken from base of buff breccia), fresh surface colour; wk vlt yellowish orange (10YR 7/2), sedimentary structures; low- and minor high-amplitude stylolites, composition; 5% microspar, 15% spar, 60% f xyn dolomite (50 μ m xtal size mode), spar concentration is highly variable across stylolites, 20% interxyn porosity, misc; minor subvertical fractures. Rock Name: sl microsparitic/sparry f xyn dolostone.

XV. APPENDIX 3, DESCRIPTION OF DRILL CUTTINGS FOR THE PANARCTIC
DEMINEX O-21 BOREHOLE, SOMERSET ISLAND

LOCALITY: Northeastern Somerset Island.

LATITUDE: 73°40'52.194"N.

LONGITUDE: 90°36'45.168"W.

GROUND ELEVATION: 368.5 m (1209').

K.B. ELEVATION: 371.3 m (1218').

SPUDDED: April 23, 1971.

RIG RELEASE: July 9, 1971.

TOTAL DEPTH (DRILLER): 1986 m (6514').

CORED INTERVALS: 1396.6-1404.8 m (4582-4609'), recovered 8.2 m (27'), 1966.0-1975.0 m (6450-6479.5'), recovered 8.7 m (28.5').

MUD REPORT:

0-152 m: air drilled.

152-578 m: reamed w/ fresh water gel system, air drilled.

578-632 m: fresh water gel system.

632-1986 m: fresh water gel, XC polymer system.

NOTE: Well depths are in metres and feet and percentages refer to the estimated proportions of drill cuttings of a given litho.

LEOPOLD FORMATION (0-234 m, 0-768')

3.0 m (10')-100% lt grey argil/silty microsparite.

6.1 m (20')-100% lt grey anhydritic sparry very f-f xyn dolostone, silty (quartzose)/gypsiferous/argil very f to f xyn dolostone.

9.1 m (30')-10% lt brown sl silty/gypsiferous/ dolomitic (f xyn) ostracodal biomicrosparite, 90% sparry f gn quartzose siltstone and very f gn quartzose sandstone.

12.2 m (40')-5% of chips contain ostracods to 5 mm in size, 95% silty/gypsiferous/sparry f xyn dolostone.

15.2 m (50')-sl brownish grey f xyn sparite.

18.3 m (60')-70% lt grey argil/microsparitic f xyn c silty to very f sandy (quartz) dolostone, 30% lt grey argil/c silty/very f sandy (quartzose) dolostone, tr ostracods to 0.5 mm in size.

21.3 m (70')-sl brownish lt grey argil/microsparitic/ c quartzose siltstone.

24.4 m (80')-80% silty/very f sandy (quartzose) sparry f xyn dolostone, 1% microsparite, 19% f xyn dolostone.

27.4 m (90')-98% lt brownish sparry f xyn siltstone, 2% spar.

30.5 m (100')-20% buff silty (quartzitic)/sparry f xyn dolostone, 79% buff silty f xyn dolostone, 1% c xyn spar.

33.5 m (110')-30% white siltstone, 55% lt brownish grey sparry siltstone/very f gn quartzose sandstone, 15% lt brown ostracodal coated gn biomicrosparite.

36.6 m (120')-20% grey silty/sparry dolostone, 80% buff argil/aphanoxyn/very f xyn dolostone.

39.6 m (130')-95% buff variously dolomitic microsparite, 5% brown gypsiferous/sparry very f xyn dolostone.

42.7 m (140')-100% lt grey argil/silty/gypsiferous/ sparry very f to f xyn dolostone.

45.7 m (150')-100% soft grey argil microsparite.

48.8 m (160')-70% buff argil micrite/microsparite, 30% grey argil micrite/microsparite.

51.8 m (170')-100% grey argil/silty (quartzose)/sparry dolostone aa w/ tr anhydrite, tr spar.

54.9 m (180')-90% buff silty/argil/sparry f xyn dolostone, 10% buff silty/argil/ gypsiferous f xyn dolostone, tr sparite.

57.9 m (190')-95% buff silty/sparry f xyn dolostone, 5% anhydritic/sparry f xyn dolostone.

61.0 m (200')-100% grey argil/silty (quartzose) microsparite w/ minor shale partings.

- 64.0 m (210')-20% grey argil/microsparitic quartzose siltstone/very-f gn quartzose sandstone, 80% dolomitic quartz-rich siltstone/very f gn sandstone.
- 67.1 m (220')-15% lt brown microsparite, 85% grey argil microsparite.
- 70.1 m (230')-10% vlt grey argil microsparite, 90% buff silty/argil microparite, tr dk grey argil/silty microsparite.
- 73.2 m (240')-aa.
- 76.2 m (250')-100% buff silty (quartzose) microsparite.
- 79.2 m (260')-100% lt brown argil microsparite.
- 82.3 m (270')-100% grey argil/silty (quartzose) microsparite, tr pyrite.
- 85.3 m (280')-100% grey argil microsparite.
- 88.4 m (290')-100% grey argil/silty (quartzose)/ microsparitic very f xyn dolostone w/ minor dk grey shale partings.
- 91.4 m (300')-aa.
- 94.5 m (310')-90% grey argil/silty (quartzose)/ microsparitic very f xyn dolostone, 10% vlt grey argil microsparite.
- 97.5 m (320')-40% vlt grey argil f xyn dolosparitic quartzose siltstone, 10% argil microsparite, 50% argil/silty (quartzose)/sparry f xyn dolostone.
- 100.6 m (330')-10% lt grey argil/silty (quartzose)/ dolomitic f xyn sparite, 90% sparry f to m xyn dolostone.
- 103.6 m (340')-30% grey argil microsparite, 70% lt grey argil/silty/microsparitic very f xyn dolostone.
- 106.7 m (350')-aa.
- 109.7 m (360')-85% lt grey argil/microsparitic f xyn dolostone, 15% dk grey argil siltstone.
- 112.8 m (370')-95% dolostone aa, 5% siltstone aa.
- 115.8 m (380')-100% lt grey argil/silty/microsparitic f xyn dolostone.
- 118.9 m (390') & 121.9 m (400')-aa.
- 125.0 m (410')-100% lt grey argil/silty/sl microsparitic f xyn dolostone aa.
- 128.0 m (420')-5% lt grey argil/dolomitic sparite, 95% lt grey microsparitic/silty/argil very f gn quartz arenite, tr dk grey shale.
- 131.1 m (430')-10% lt grey silty/argil/microsparitic f xyn dolostone, 90% lt grey dolomitic (very f xyn) microsparite.
- 134.1 m (440')-5% lt grey microsparite, 90% lt grey silty/very f gn sandy/microsparitic f xyn dolostone, 5% dk grey shale.
- 137.2 m (450')-5% lt grey microsparite, 95% lt grey silty/very f gn sandy/sl sparry very f to f xyn dolostone.
- 140.2 m (460')-100% lt grey argil/silty (quartzose) microsparitic very f xyn dolostone.
- 143.3 m (470')-5% dk grey shale, 30% dolomitic (f xyn) microsparite, 65% lt grey silty/argil/sparry very f gn quartz arenite.
- 146.3 m (480')-30% lt grey argil/silty/microsparitic very f gn quartz arenite, 70% vlt grey silty microsparite.
- 149.4 m (490')-100% lt grey silty/argil/variously sparry very f xyn dolostone.
- 152.4 m (500')-100% lt grey argil/sl micaceous/silty/very f gn sandy (quartzose)/microsparitic very f xyn dolostone.
- 155.4 m (510')-no recovery.
- 158.5 m (520')-100% lt grey argil/very f gn sandy (quartzose) microsparitic quartz siltstone, tr dk grey siltstone.
- 161.5 m (530')-95% lt grey microsparitic/silty (quartzose) claystone, 5% dk grey shale, tr favositid corals (walls are very f xyn dolomite, corallites are filled w/ very f xyn spar).
- 164.6 m (540')-100% lt grey & lt buff silty/argil/ microsparitic very f xyn dolostone.
- 167.6 m (550')-100% lt grey to lt buff argil/sl silty/ microsparitic very f to f xyn dolostone.
- 170.7 m (560')-99% lt grey argil/silty/ microsparitic very f xyn dolostone, 1% dk grey shale, minor shale partings.
- 173.7 m (570')-100% lt grey argil/silty (quartzose)/ microsparitic very f xyn dolostone.
- 176.8 m (580')-98% lt grey to buff silty (quartzose)/argil microsparitic very f xyn dolostone, tr mica, tr dk grey shale, 2% grey to buff argil/silty/ microsparitic very f to f gn quartz arenite w/ tr mica.

- 179.8 m (590')-100% lt buff silty (quartzose) f xyn dolostone, tr very f gn quartzose sand gns and tr microcline, minor dk grey shale partings.
- 182.9 m (600')-100% buff silty/argil/f xyn dolostone, tr gypsum.
- 185.9 m (610')-99% buff silty (quartzose) argil microsparite, tr ostracods, 1% dk grey siltstone.
- 189.0 m (620')-60% microsparitic f xyn dolostone, 40% buff microsparitic/silty/dolomitic (very f xyn) claystone, tr dk grey shale, tr ostracods, tr pyrite.
- 192.0 m (630')-99% lt buff microsparitic claystone w/ shale partings, 1% dk grey shale.
- 195.1 m (640')-100% buff silty/argil/microsparitic very f to f xyn dolostone, tr shale partings.
- 198.1 m (650')-100% buff microsparitic very f gn quartz arenite, tr feldspar, tr shale partings.
- 201.2 m (660')-42% lt grey argil very f xyn dolostone w/ shale partings, 2% dk grey shale, 2% lt buff very f gn quartzose sandstone aa, 54% lt grey microsparitic dolostone.
- 204.2 m (670')-10% lt buff argil microsparite, 40% lt grey dolomitic (very f xyn)/argil microsparite, 50% lt grey argil very f xyn dolostone.
- 207.2 m (680')-90% silty (quartzose) argil microsparite, 10% dk grey silty (quartz-rich) shale and argil quartzose siltstone.
- 210.3 m (690')-10% lt brown microsparite, 79% buff microsparitic/argil quartzose siltstone, 10% white very f gn quartzose sandstone aa, 1% dk grey shale.
- 213.4 m (700')-98% vlt buff argil/microsparitic quartzose siltstone/very f gn quartz arenite, 2% dk grey shale.
- 216.4 m (710')-100% vlt buff microsparitic/argil quartzose siltstone-very f gn quartz arenite w/ up to 20% porosity.
- 219.5 m (720')-25% argil/dolomitic (very f to f xyn) microsparite, 5% dk grey shale, 70% lt grey to lt buff argil/silty (quartzose) microsparitic f xyn dolostone w/ shale partings.
- 222.5 m (730')-aa.
- 225.6 m (740')-100% vlt buff argil microsparite.
- 228.6 m (750')-100% lt grey to vlt buff argil microsparitic quartzose siltstone.
- 231.6 m (760')-97% vlt buff argil/microsparitic very f to f xyn dolostone w/ minor dk grey shale partings, 3% dk grey shale.
- 234.7 m (770')-98% vlt brown argil/microsparitic very f gn quartz arenite w/ a minor proportion of dk grey shale partings. 2% dk grey shale.

CARBONATE-EVAPORITE SEQUENCE (234-1265 m, 768-4150')

UNIT H (234-327 m, 768-1073')

- 237.7 m (780')-10% white xyn gypsum, 20% c xyn selenite, 25% dk grey silty shale, 5% lt brown microsparite, 40% lt buff microsparitic very f xyn dolostone.
- 240.8 m (790')-aa.
- 243.8 m (800')-20% sl anhydritic/microsparitic very f xyn dolostone, 15% white xyn gypsum, 25% clear selenite, 40% lt brown very f xyn anhydrite.
- 246.9 m (810')-60% lt brown very f xyn anhydrite, 25% c xyn selenite, 10% opaque white gypsum xtal frags, 5% microsparite.
- 249.9 m (820')-10% buff sl silty (quartzose)/argil microsparite, 84% buff sl silty (quartzose)/argil very f xyn dolostone, 5% clear to brown selenite to 1 mm in size, 1% shale.
- 253.0 m (830')-10% silty (quartzose) argil microsparite, 86% buff very f to f xyn dolostone, 2% clear selenite, 2% dk grey shale.
- 256.0 m (840')-50% lt brown micrite/microsparite, 24% lt brown argil/dolomitic (f xyn) microsparite, 25% clear to lt brown selenite, 1% dk grey shale.
- 259.1 m (850')-95% lt brown translucent anhydrite w/ minor microsparite, 5% clear selenite.
- 262.1 m (860')-65% lt brown dolomitic (f xyn) microsparite, 25% white dolomitic f xyn anhydrite, 10% clear selenite.
- 265.2 m (870')-15% lt buff microsparitic/argil f xyn dolostone, 77% vlt grey to lt brown f xyn dolostone, 2% white opaque gypsum, 2% clear selenite, 3% lt brown anhydrite, 1% lt grey

microsparitic claystone.

- 268.2 m (880')-70% lt brown microsparite, 10% lt brown dolomitic (f xyn) microsparite, 10% white f xyn anhydrite, 10% clear selenite.
- 271.3 m (890')-50% lt brown microsparite, 30% lt brown dolomitic (f xyn) microsparite, 10% clear selenite, 10% white microsparitic f(?) xyn gypsum.
- 274.3 m (900')-95% buff to brown sl silty (quartzose) f xyn dolostone, 5% clear selenite.
- 277.4 m (910')-20% buff to brown dolomitic (f xyn) microsparite, 65% vlt buff microsparitic/argil f xyn dolostone, 10% clear selenite, 5% white translucent f(?) xyn gypsum.
- 280.4 m (920')-25% buff to lt brown dolomitic (f xyn) microsparite, 60% vlt buff microsparitic/argil f xyn dolostone, 10% clear selenite, 5% white translucent gypsum.
- 283.5 m (930')-5% vlt buff microsparitic f xyn dolostone, 87% vlt buff sl silty (quartzose) f xyn dolostone, 5% clear selenite, 3% white translucent gypsum.
- 286.5 m (940')-10% lt buff microsparitic f xyn dolostone, 15% clear selenite, 5% white translucent gypsum, 70% vlt buff f xyn dolostone.
- 289.6 m (950')-15% dolomitic (f xyn) microsparite, 10% clear selenite, 73% vlt buff f xyn dolostone, 2% white translucent f(?) xyn gypsum.
- 292.6 m (960')-60% lt brown gypsiferous microsparite, 25% clear selenite, 10% white translucent gypsum, 5% lt brown translucent/microsparitic gypsum.
- 295.7 m (970')-30% microsparite, 60% vlt buff sl silty/ argil microsparite, 5% clear selenite, 3% white translucent gypsum, 2% shale.
- 298.7 m (980')-24% lt buff microsparite, 72% lt buff argil/silty (quartzose) microsparitic f xyn dolostone, 1% shale, 3% clear selenite.
- 301.8 m (990')-10% lt brown microsparitic gypsum, 80% vlt buff argil/microsparitic f xyn dolostone, 5% clear to lt brown selenite, 5% white gypsum xtals frags, tr dk grey shale.
- 304.8 m (1000')-84% lt brown sl microsparitic/argil very f xyn dolostone, 5% clear selenite, 5% clear to lt brown f xyn gypsum, 5% white f xyn gypsum, 1% dk grey shale.
- 307.8 m (1010')-30% lt brown microsparite, 39% clear selenite, 30% white f xyn gypsum, tr dk grey shale.
- 310.9 m (1020')-5% clear selenite, 50% lt buff microsparite, 5% white f xyn gypsum, 2% dk grey shale, 38% very f xyn gypsum.
- 313.9 m (1030')-5% buff microsparite, 40% buff microsparitic f xyn dolostone, 47% buff f xyn dolostone, 5% clear selenite, 3% white gypsum xtals, tr dk grey shale.
- 317.0 m (1040')-5% buff microsparite, 94% lt buff microsparitic f to m xyn dolostone, 1% clear selenite.
- 320.0 m (1050')-aa w/ tr shale partings.
- 323.1 m (1060')-79% lt buff sparry f xyn dolostone, 5% buff microsparite, 15% buff to clear gypsum, 1% dk grey shale.
- 326.1 m (1070')-5% buff microsparite, 30% microsparitic f xyn dolostone, 20% clear selenite, 45% buff f xyn dolostone.

UNIT G (327-507 m, 1073-1663')

- 329.2 m (1080')-99% buff to lt brown f xyn dolostone, 1% dk grey shale.
- 332.2 m (1090')-40% white f xyn dolostone, 35% clear selenite, 25% white gypsum xtals, tr microsparite, tr shale.
- 335.3 m (1100')-45% m xyn dolostone, tr sparite, 40% f xyn dolostone, 10% clear selenite, 5% white gypsum xtals.
- 338.3 m (1110')-76% buff f to m xyn dolostone, 20% clear selenite, 3% white gypsum xtals, 1% dk grey shale.
- 341.4 m (1120')-1% buff microsparite, 10% white gypsum xtals, 25% clear selenite, 64% lt brown f to m xyn dolostone.
- 344.4 m (1130')-10% clear selenite, 3% white f xyn gypsum, 1% dk grey shale, 86% lt brown f xyn dolostone.
- 347.5 m (1140')-30% clear selenite, 70% lt brown f xyn dolostone, tr dk grey shale.
- 350.5 m (1150')-aa.

- 353.6 m (1160')-1% lt buff microsparite, 10% clear selenite, 5% white f(?) xyn gypsum, 2% lt grey chert, 82% lt brown f xyn dolostone.
- 356.6 m (1170')-2% lt brown microsparite, 10% clear selenite, 88% lt brown f to m xyn dolostone.
- 359.7 m (1180')-5% microsparitic f xyn dolostone, 15% clear selenite, 2% white f(?) xyn gypsum, 78% lt brown f xyn dolostone (in part anhydritic), tr pyrite, tr lt grey chert.
- 362.7 m (1190')-3% lt brown microsparite, 5% clear selenite, 89% lt brown f xyn dolostone, 3% white f xyn gypsum.
- 365.8 m (1200')-15% clear selenite, 5% white f(?) xyn gypsum, 1% dk grey shale, 79% lt brown f xyn dolostone.
- 368.8 m (1210')-5% selenite, 95% lt brown f xyn dolostone.
- 371.9 m (1220')-10% clear selenite, 2% white f xyn gypsum, 1% dk grey shale, 87% lt brown very f to f xyn dolostone.
- 374.9 m (1230')-15% clear selenite, 2% dk grey shale, 5% white f xyn gypsum, 5% lt brown f xyn anhydrite, 73% lt brown f xyn dolostone, in part sl anhydritic.
- 378.0 m (1240')-5% lt buff microsparite, 30% clear selenite, 3% dk grey shale, 62% lt brown f xyn dolostone.
- 381.0 m (1250')-1% lt buff microsparite, 20% clear selenite, 5% white f(?) xyn gypsum, 74% lt brown f xyn dolostone.
- 384.0 m (1260')-1% buff microsparite, 10% selenite, 86% lt brown f xyn anhydritic dolostone, 3% white f(?) xyn gypsum.
- 387.1 m (1270')-1% buff microsparite, 60% white f xyn anhydrite, 39% lt brown f xyn anhydritic dolostone.
- 390.1 m (1280')-20% selenite, 5% white f(?) xyn gypsum, 3% dk grey siltstone, 20% white f xyn anhydrite, 52% lt brown anhydritic f xyn dolostone.
- 393.2 m (1290')-25% clear selenite, 74% lt brown f xyn dolostone, 1% dk grey shale.
- 396.2 m (1300')-25% clear selenite, 10% white gypsum xtal frags, 3% dk grey shale, 62% lt brown f xyn dolostone.
- 399.3 m (1310')-tr microsparite, 5% clear selenite, 5% white f(?) xyn gypsum, 90% buff to lt brown f xyn dolostone (in part gypsiferous).
- 402.3 m (1320')-25% clear selenite, 10% white f xyn gypsum, 2% buff microsparite, 2% grey shale, 61% f xyn dolomitic gypsum.
- 405.4 m (1330')-tr lt grey chert, 15% clear selenite, 3% white gypsum xtal frags, 82% lt brown very f-f xyn dolostone.
- 408.4 m (1340')-15% clear selenite, 5% white f xyn gypsum, 1% dk grey shale, 79% buff to lt brown f xyn dolostone.
- 411.5 m (1350')-10% clear selenite, 5% white f(?) xyn gypsum, 3% lt brown anhydrite, 82% lt brown f xyn dolostone, tr pyrite, tr shale.
- 414.5 m (1360')-15% clear selenite, 1% microsparite, 10% lt brown dolomitic (f xyn) gypsum, 5% white c xyn gypsum xtal frags, 6% lt brown f xyn gypsum.
- 417.6 m (1370')-15% clear selenite, 2% dk grey shale, 83% lt brown f xyn dolostone.
- 420.6 m (1380')-10% clear selenite, 5% dk grey shale, 3% white f xyn gypsum, 82% lt brown f xyn dolostone.
- 423.7 m (1390')-2% dk grey shale, 5% clear selenite, 10% white f xyn gypsum, 82% lt brown f xyn dolostone.
- 426.7 m (1400')-15% clear selenite, 2% dk grey shale, 10% white f xyn gypsum, 73% lt brown f xyn dolostone, tr pyrite.
- 429.8 m (1410')-10% clear selenite, 1% dk grey shale, 2% white f xyn gypsum, 87% lt brown f to m xyn dolostone.
- 432.8 m (1420')-10% white f xyn gypsum, 5% lt buff microsparite, 10% clear selenite, 3% dk grey shale, 72% lt brown f to m xyn dolostone.
- 435.9 m (1430')-3% vlt buff microsparite, 15% clear selenite, 5% white gypsum xtal frags, 77% lt brown f xyn dolostone, 1% dk grey shale.
- 438.9 m (1440')-10% clear to lt brown selenite, 5% white f(?) xyn gypsum, 85% lt brown f to m xyn dolostone.
- 443.0 m (1450')-5% clear selenite, 5% white gypsum xtal frags, 90% lt brown f xyn dolostone,

- tr pyrite, tr microsparitic f xyn dolostone.
- 445.0 m (1460')-1% lt brown chert, 10% clear selenite, 2% dk grey shale, 5% white f xyn gypsum, 82% lt brown f xyn dolostone.
- 448.1 m (1470')-2% lt buff microsparite, 10% clear selenite, 5% white f(?) xyn gypsum, 83% lt brown f to m xyn dolostone, tr pyrite.
- 451.1 m (1480')-5% clear selenite, 1% microsparite, 5% white f xyn gypsum, 89% lt brown f to m xyn dolostone.
- 454.2 m (1490')-tr pyrite, 5% clear selenite, 1% white f xyn gypsum, 94% lt brown f to m xyn dolostone.
- 457.2 m (1500')-15% clear selenite, tr pyrite, 5% white f(?) xyn gypsum, 1% dk grey shale, 79% lt brown to brown f to m xyn dolostone.
- 460.2 m (1510')-7% lt buff microsparite, 10% clear selenite, tr shale, 5% white c xyn gypsum xtal frags, 78% lt brown to brown f xyn dolostone.
- 463.3 m (1520')-tr grey shale, 1% clear selenite, 2% white f xyn gypsum, 97% lt to m brown f to m xyn dolostone.
- 466.3 m (1530')-5% clear selenite, 2% white c xyn gypsum, 2% dk grey shale, 91% lt brown f to m xyn dolostone.
- 469.4 m (1540')-5% clear selenite, 5% white f xyn gypsum, 2% dk grey shale, 88% lt to m brown f xyn dolostone.
- 472.4 m (1550')-15% clear selenite, 5% white f xyn gypsum, 80% lt brown f to m xyn dolostone.
- 475.5 m (1560')-1% lt buff microsparite, 5% clear selenite, tr pyrite, 2% white c xyn gypsum xtal frags, 1% dk grey shale, 91% buff f xyn dolostone.
- 478.5 m (1570')-2% lt buff microsparite, tr pyrite, 2% dk grey shale, 10% clear selenite, 5% white f(?) xyn gypsum, 81% lt brown f xyn dolostone.
- 481.6 m (1580')-10% clear selenite, 5% white f xyn gypsum, 2% dk grey shale, 83% lt brown f xyn dolostone w/ minor shale partings.
- 484.6 m (1590')-2% lt buff microsparite, 20% clear to lt buff selenite, 15% white c xyn gypsum xtal frags, tr pyrite, 2% dk grey shale, 61% lt brown f xyn dolostone.
- 487.7 m (1600')-15% clear selenite, 3% white c xyn gypsum xtal frags, 2% dk grey shale, 80% lt to m brown f to m xyn dolostone.
- 490.7 m (1610')-5% clear selenite, 3% white c xyn gypsum, tr pyrite, 2% dk grey shale, 90% lt brown f xyn dolostone.
- 493.8 m (1620')-10% clear selenite, 10% white c xyn gypsum xtal frags, 79% lt brown f to m xyn dolostone, 1% dk grey shale.
- 496.8 m (1630')-5% lt brown microsparitic f xyn dolostone, 15% clear selenite, 3% white c xyn gypsum xtal frags, 2% dk grey shale, 75% lt to m brownish f to m xyn dolostone w/ minor shale partings.
- 499.9 m (1640')-2% lt buff microsparite, 15% clear selenite, 10% white c xyn gypsum xtal frags, tr dk grey shale, 73% lt to m brown f xyn dolostone.
- 502.9 m (1650')-1% lt buff dolomitic (f xyn) microsparite, 15% clear selenite, 84% white to lt brown f xyn anhydrite.
- 506.0 m (1660')-15% lt brown very f to f xyn anhydrite, 30% clear anhydrite, 5% white c xyn gypsum xtal frags, tr dk grey shale, 50% lt brown very f to f xyn dolostone.

UNIT F (507-677 m, 1663-2221')

- 509.0 m (1670')-3% lt buff microsparite, tr lt grey chert, 5% white c xyn gypsum xtal frags, 2% dk grey shale, 90% lt buff to lt brown dolomitic f xyn anhydrite.
- 512.1 m (1680')-20% buff to lt brown dolomitic f xyn sparite, tr lt grey chert, 20% white f xyn anhydritic gypsum, 60% buff to lt brown f xyn anhydrite.
- 515.1 m (1690')-95% buff to lt brown microsparite, tr pyrite, 5% clear selenite.
- 518.2 m (1700')-25% buff to brown microsparite, 10% buff to brown dolomitic (f xyn) microsparite, 10% buff to lt brown microsparitic f xyn dolostone, 46% white gypsiferous f xyn dolostone, tr lt buff chert, 5% clear selenite, 3% white f xyn gypsum, 1% dk grey shale, tr pyrite.

- 521.2 m (1710')-2% lt brown microsparite, 20% white microsparitic f to m xyn gypsum, 34% clear selenite, 1% brownish grey chert, 43% lt brown f xyn dolostone, tr dk grey shale.
- 524.3 m (1720')-5% white c xyn gypsum xtal frags, 95% lt brown microsparite.
- 527.3 m (1730')-90% lt to m brown dolomitic (f xyn) microsparite, 5% clear selenite, tr lt buff chert, 5% white c xyn gypsum xtal frags.
- 530.4 m (1740')-5% white c xyn gypsum xtal frags, 92% lt brown dolomitic (f to m xyn) microsparite, 3% clear selenite.
- 533.4 m (1750')-10% white c xyn gypsum xtal frags, 89% lt brown dolomitic (f to m xyn) microsparite, tr pyrite, 1% clear selenite.
- 536.4 m (1760')-94% lt brown microsparitic f to m xyn dolostone, tr stylolites, tr pyrite, 1% selenite, 5% white f xyn gypsum.
- 539.5 m (1770')-50% lt brown dolomitic (f xyn) microsparite, 30% lt brown microsparite, 15% white to vlt grey microsparite, 5% clear selenite.
- 542.5 m (1780')-90% buff to lt brown microsparitic f xyn dolostone, 10% selenite, tr lt buff chert, tr pyrite, tr vlt buff anhydrite.
- 545.6 m (1790')-1% microsparite, 93% buff to lt brown very f xyn microsparitic anhydrite, 5% white c xyn gypsum xtal frags, 1% buff chert, tr dk grey shale.
- 548.6 m (1800')-84% lt brown microsparitic anhydrite, 10% vlt buff anhydrite, 1% buff to lt brown chert, 5% white c xyn gypsum xtal frags.
- 551.7 m (1810')-20% lt buff to brown microsparite, 50% lt brown microsparitic f xyn dolostone, 15% clear selenite, 15% white c xyn gypsum xtal frags.
- 554.7 m (1820')-64% lt brown microsparite, 15% clear selenite, 20% white c xyn gypsum xtal frags, 1% dk grey shale.
- 557.8 m (1830')-5% clear selenite, 15% white f(?) xyn gypsum, 2% dk grey shale, 78% lt brown microsparite.
- 560.8 m (1840')-80% white to brown gypsiferous f xyn anhydrite, 20% white c xyn gypsum xtal frags, tr dk grey shale.
- 563.9 m (1850')-90% lt brown m xyn dolostone w/ up to 20% porosity (in part filled w/ gypsum), 5% dk grey silty shale, tr rd c quartz gns, 5% white c xyn gypsum xtal frags.
- 566.9 m (1860')-tr rd c (sand-sized) chert gns, tr lt grey chert, tr clear selenite, 1% white c xyn gypsum xtal frags, 1% dk grey shale, 98% lt brown m xyn dolostone w/ porosity to 20%.
- 570.0 m (1870')-tr pyrite, 93% buff to lt brown m xyn dolostone w/ up to 20% porosity, 1% dk grey shale, 1% dolomitic (very f xyn) microsparite, 5% sparry m xyn dolostone.
- 573.0 m (1880')-2% white c xyn gypsum xtal frags fill or line fractures, 1% soft black shale, 55% buff to lt brown f xyn dolostone w/ up to 20% porosity in part filled w/ white gypsum, vugs to 0.3 mm in size, 2% lt brown microsparite, 40% lt brown sparry f xyn dolostone.
- 576.1 m (1890')-5% lt brown microsparite, 30% buff microsparitic f xyn dolostone, 65% lt buff f xyn dolostone w/ up to 20% interxyn porosity.
- 579.1 m (1900')-84% lt buff microsparitic f xyn dolostone, 15% white c xyn gypsum xtal frags, 1% clear selenite.
- 582.2 m (1910')-20% lt brown microsparite, 15% white c xyn gypsum xtal frags, 2% clear selenite, tr dk grey shale, 63% lt buff to buff very f to f xyn dolostone.
- 585.2 m (1920')-40% lt buff to buff microsparitic f xyn dolostone, 40% white f xyn gypsum, 20% buff to lt brown f xyn dolostone, tr dk grey shale.
- 588.3 m (1930')-10% buff microsparite, 20% lt buff microsparitic f xyn dolostone, 70% vlt buff f xyn dolostone w/ up to 15% porosity, tr selenite.
- 591.3 m (1940')-40% lt brownish grey sparry f xyn dolostone, 10% buff microsparite, 50% lt brownish grey f xyn dolostone.
- 594.4 m (1950')-40% white f xyn gypsiferous anhydrite, 60% buff to lt brown f xyn anhydrite.
- 597.4 m (1960')-30% buff sparry f xyn dolostone, 5% buff f xyn sparite, 65% white f xyn anhydrite.
- 600.5 m (1970')-5% buff microsparite, 94% buff very f to f xyn dolostone, 1% dk grey shale.
- 603.5 m (1980')-30% lt buff microsparite, 3% dk grey shale, 67% lt to m brown dolostone, tr

clear selenite.

- 606.6 m (1990')-80% microsparite, 5% white gypsum (mainly lining fractures in microsparite), minor low-amplitude stylolites, 10% buff microsparitic f xyn dolostone, 5% white f xyn dolostone.
- 609.6 m (2000')-5% dk grey shale, 90% lt buff to brown microsparite, 5% white c xyn gypsum, tr clear selenite.
- 612.6 m (2010')-15% buff sl anhydritic/sl argil microsparite, 85% buff microsparitic m xyn dolostone, tr dk grey shale, tr selenite, tr grey chert.
- 615.7 m (2020')-93% lt brown sl sparry f to m xyn dolostone w/ up to 20% interxyn porosity, 5% white c xyn gypsum xtal frags, gypsum also fills fractures and interxyn pores in dolostone, 2% lt brown microsparite, tr pyrite, tr dk grey shale, tr clear selenite.
- 618.7 m (2030')-60% lt brown microsparite, 40% lt buff f xyn dolostone, tr white f xyn anhydrite, tr gypsum. Minor bitumen fills interxyn pores.
- 621.8 m (2040')-60% lt brown microsparite, tr anhydrite and clear selenite, 39% f to m xyn sparite w/ 25% ossicles (some have pentagonally-shaped exteriors), 1% black shale, minor low-amplitude stylolites.
- 624.8 m (2050')-67% lt brown to buff microsparitic f to m xyn dolostone, 30% f to m xyn dolostone, 1% dk grey shale, 2% white f xyn gypsum, tr white anhydrite, tr ossicles.
- 627.9 m (2060')-15% buff sparry f to m xyn dolostone, 82% buff to lt brown f xyn anhydrite, 2% buff microsparite, 1% dk grey shale.
- 630.9 m (2070')-3% buff microsparite, 30% white to buff f xyn anhydrite, 4% buff microsparitic f xyn dolostone, 62% lt buff very f to f xyn dolostone w/ up to 20% interxyn porosity in part filled w/ white f xyn gypsum, tr clear anhydrite xtals to 0.5 mm in size, 1% vdk brownish grey shale, tr selenite and bitumen.
- 634.0 m (2080')-1% microsparitic very f gn quartz sandstone, 20% lt brown f xyn anhydrite, 40% buff microsparitic very f to f xyn dolostone, 39% very f to f xyn dolostone, tr black chert, tr clear anhydrite xtals to 0.5 mm, tr vdk brownish grey shale.
- 637.0 m (2090')-88% buff to brown microsparitic f to m xyn dolostone, 10% buff to brown microsparite, 2% buff f xyn anhydrite.
- 640.1 m (2100')-30% lt brown very f to f xyn dolostone, 2% white gypsum, 30% buff f xyn anhydrite, 27% brown microsparitic f xyn dolostone, 10% white f xyn gypsum, 1% dk grey shale.
- 643.1 m (2110')-60% brown microsparite, 2% vdk brownish grey shale, 5% lt brown f xyn anhydrite, 33% dolomitic (f to m xyn) microsparite.
- 646.2 m (2120')-59% white to lt brown f xyn anhydrite, 10% brown microsparite, 10% buff to lt brown microsparitic f xyn dolostone, 10% lt brown dolomitic microsparite, 10% lt buff f to m xyn dolostone, 1% vdk grey shale.
- 649.2 m (2130')-60% lt brown f xyn anhydrite, 20% lt brown microsparitic anhydrite, 10% lt brown microsparite, 10% lt buff f xyn dolostone, tr dk brownish grey shale.
- 652.3 m (2140')-10% vdk brownish grey shale, 10% buff f xyn anhydrite, 70% lt brown microsparite (in part dolomitic), 5% white f xyn gypsum, 5% vlt buff f xyn dolostone w/ minor bitumen in pores, tr pyrite, tr high-amplitude stylolites accentuated w/ bitumen.
- 655.3 m (2150')-5% lt buff chert, 2% lt brown microsparite, 10% lt buff f xyn dolostone, 83% buff to lt brown f xyn anhydrite.
- 658.4 m (2160')-1% buff chert, 1% lt brown microsparite, tr dk grey shale, 5% lt brown very f xyn dolostone, 93% buff f xyn anhydrite.
- 661.4 m (2170')-3% lt brown microsparite, 2% lt brown dolomitic microsparite, 2% white f xyn gypsum, 78% lt buff f xyn dolostone, 15% buff f xyn anhydrite.
- 664.5 m (2180')-tr dk grey shale, 10% vlt buff very f to f xyn dolostone (in part microsparitic w/ minor shale partings), 10% buff f xyn anhydrite, 50% brown microsparite, 30% brown dolomitic (f xyn) microsparite, tr vlt buff chert, tr white c xyn gypsum xtal frags, minor low-amplitude stylolites in carbonate, tr pyrite.
- 667.5 m (2190')-53% lt brown microsparite (in part dolomitic), 25% white to vlt buff f xyn dolostone, 10% dolomitic (f xyn) microsparite, 2% buff f xyn anhydrite, 10% white c xyn gypsum xtal frags, tr dk grey shale.
- 670.6 m (2200')-70% brown microsparite, 25% lt buff gypsum, 5% white f xyn dolostone, tr

colonial corals.

673.6 m (2210')-25% buff f xyn anhydrite, 20% brown microsparite, 20% buff sparry f xyn dolostone, 20% lt brown microsparite, 10% lt brown dolomitic (f xyn) microsparite, 5% white f xyn gypsum (especially lining fractures).

UNIT E (677-932 m, 2221-3058')

- 676.7 m (2220')-20% brown f xyn anhydrite, 5% brown microsparite, 10% buff dolomitic (f xyn) microsparite, 40% buff sparry/microsparitic f xyn dolostone (in part anhydritic), 25% buff f xyn dolostone, tr dk grey shale, tr white f xyn gypsum.
- 679.7 m (2230')-20% brown microsparite, tr dk grey shale, 10% buff to lt brown dolomitic microsparite, 20% buff microsparitic f xyn dolostone, 25% lt buff f xyn dolostone (w/ high porosity), 25% white to buff f xyn anhydrite, tr gypsum (filling fractures).
- 682.8 m (2240')-10% brown microsparite, 10% white to buff f xyn anhydrite, 20% lt brown dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, 55% lt buff very f to f xyn dolostone, tr white gypsum, tr dk grey shale.
- 685.8 m (2250')-75% buff anhydritic very f xyn dolostone, 20% white to brown f xyn anhydrite, tr dk grey shale, 5% buff microsparitic f xyn dolostone.
- 688.8 m (2260')-25% buff microsparite, 45% white to brown f xyn anhydrite, 15% buff sparry f xyn dolostone, 10% buff dolomitic (f xyn) microsparite, 5% lt buff f xyn dolostone, tr dk grey shale.
- 691.9 m (2270')-20% white to lt brown f xyn anhydrite, 50% buff very f to f xyn dolostone, 15% buff microsparitic very f xyn dolostone, 15% buff dolomitic (f xyn) microsparite, tr dk grey shale.
- 694.9 m (2280')-5% brown microsparite, 15% buff to brown dolomitic (f xyn) microsparite, 60% white to brown f xyn anhydrite, 10% buff microsparitic f xyn dolostone, 10% lt buff very f to f xyn dolostone.
- 698.0 (2290')-5% white to brown f xyn anhydrite, 80% white to brown f xyn anhydrite, 10% brown microsparite, 5% buff microsparitic f xyn dolostone.
- 701.0 m (2300')-10% brown microsparite, 15% microsparitic f xyn dolostone (in part anhydritic), tr dk grey shale, 10% buff sparry f xyn dolostone and f xyn dolostone, 64% white to brown f xyn anhydrite, tr clear anhydrite xtals to 1 mm, 1% white gypsum.
- 704.1 m (2310')-20% brown microsparite, 10% buff dolomitic (f xyn) microsparite, 69% white to brown f xyn anhydrite, tr clear anhydrite xtal frags to 1 mm in size, 1% dk grey shale.
- 707.1 m (2320')-1% brown microsparite, 2% brown dolomitic (f xyn) microsparite, 10% buff very f xyn dolostone, 87% white to brown f xyn anhydrite.
- 710.2 m (2330')-1% microsparite, 99% white to brown f xyn anhydrite.
- 713.2 m (2340')-14% brown microsparite, 25% white to brown f xyn anhydrite, 60% dk brown f xyn dolostone, 1% dk grey shale.
- 716.3 m (2350')-15% buff microsparite, 10% dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, 5% buff to brown bituminous f to m xyn dolostone w/ up to 20% interxyn porosity (in part filled w/ bitumen), tr dk grey shale, 65% white to brown very f to f xyn anhydrite.
- 719.3 m (2360')-tr rd m sand-sized quartz gns, 20% buff microsparite, 10% buff dolomitic microsparite, 5% buff microsparitic f xyn dolostone, 10% buff to brown f to m xyn dolostone w/ up to 20% porosity (in part filled w/ bitumen), 1% dk grey shale, 53% white to brown f xyn anhydrite, 1% clear anhydrite xtal frags.
- 722.4 m (2370')-10% white to buff f xyn anhydrite, 5% buff microsparite, 10% buff dolomitic f xyn microsparite, 5% buff microsparitic f xyn dolostone, 70% buff to brown f xyn dolostone w/ up to 20% interxyn porosity.
- 725.4 m (2380')-10% buff microsparite, 10% buff dolomitic microsparite, 5% buff f to m xyn microsparitic f xyn dolostone, 10% white to brown f xyn anhydrite, 64% buff to brown f to m xyn dolostone w/ up to 20% interxyn porosity, 1% dk grey shale.
- 728.5 m (2390')-10% buff microsparite, 20% white to brown f xyn anhydrite, 15% buff dolomitic microsparite, tr buff chert, 10% microsparitic f to m xyn dolostone, 40% buff to brown f to m xyn dolostone w/ up to 15% interxyn porosity, tr rd c sand-sized quartz

- gns, 5% white very f xyn gypsum.
- 731.5 m (2400')-5% buff microsparite, 15% buff dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, 20% white to brown f xyn anhydrite, 30% white very f xyn gypsum, 25% buff very f to f xyn dolostone.
- 734.6 m (2410')-1% brown microsparite, 25% white to brown very f to f xyn anhydrite, 74% brown f to m xyn dolostone w/ up to 10% interxyn porosity (in part filled w/ bitumen).
- 737.6 m (2420')-2% white to brown f xyn dolomitic anhydrite, 1% buff dolomitic microsparite, 97% brown m xyn dolostone.
- 740.7 m (2430')-5% buff dolomitic microsparite, 10% white very f to f xyn gypsum, 15% brown f xyn anhydrite, 70% brown f to m xyn dolostone.
- 743.7 m (2440')-1% buff sparry f to m xyn dolostone, 99% brown f to m xyn dolostone w/ shale partings and up to 25% interxyn and vuggy porosity (in part filled w/ bitumen).
- 746.8 m (2450')-2% white f xyn gypsum, 1% dk grey shale, 2% buff f xyn anhydrite, 95% brown f to m xyn dolostone w/ up to 20% porosity (in part filled w/ bitumen), minor shale partings, tr sparry dolostone, tr c xyn sparite.
- 749.8 m (2460')-10% white f xyn gypsum, 20% white to brown f xyn anhydrite, 2% dk grey shale, 5% white f(?) xyn gypsum, 1% buff microsparite, 2% buff dolomitic sparite, 60% brown f to m xyn dolostone.
- 752.9 m (2470')-2% buff microsparite, tr dk grey shale, 98% brown f to m xyn dolostone.
- 755.9 m (2480')-2% buff microsparite, 1% buff dolomitic microsparite, tr pyrite, 5% white to brown f xyn anhydrite, 1% dk grey shale, 91% brown very f to f xyn dolostone w/ minor shale partings, tr white f xyn gypsum.
- 759.0 m (2490')-3% white f xyn gypsum, 3% lt buff microsparite, 5% white to buff f xyn anhydrite, 3% buff dolomitic (f xyn) microsparite, 1% sparry f xyn dolostone, 5% white f xyn gypsum, 80% white to brown f to m xyn dolostone w/ up to 20% porosity (in part filled w/ bitumen), tr dk grey shale.
- 762.0 m (2500')-5% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 30% white to buff f xyn anhydrite, 10% white f xyn gypsum, 50% buff to brown very f to m xyn dolostone w/ minor shale partings and up to 20% interxyn porosity (in part filled w/ gypsum).
- 765.0 m (2510')-3% lt brown microsparite, 10% buff dolomitic (f xyn) microsparite, 3% buff sparry f xyn dolostone, 5% white to brown f xyn anhydrite, 3% white f xyn gypsum, 76% buff to brown f to m xyn dolostone, tr dk grey shale.
- 768.1 m (2520')-5% buff microsparite, 10% buff dolomitic microsparite, 2% buff microsparitic f xyn dolostone, 5% white to buff f xyn anhydrite, 3% white f(?) xyn gypsum, 75% buff to brown f to m xyn dolostone w/ up to 10% interxyn porosity and w/ minor dk grey shale partings.
- 771.1 m (2530')-aa.
- 774.2 m (2540')-1% white f xyn gypsum, 5% dk grey shale, tr microsparite and dolomitic microsparite, 1% white to brown f xyn anhydrite, 93% buff to brown very f to m xyn dolostone w/ tr ossicles.
- 777.2 m (2550')-2% buff microsparite, 1% white c xyn gypsum xtal frags, 94% buff to brown f to m xyn dolostone w/ 3% dk grey shale partings.
- 780.3 m (2560')-15% buff microsparite, 10% buff sparite and minor dolomitic microsparite, 2% lt buff to buff microsparitic very f to m xyn dolostone, 5% dk grey shale, 3% white f xyn gypsum, 3% white to buff anhydrite, 62% buff to brown very f to m xyn dolostone.
- 783.3 m (2570')-5% buff microsparite, 10% buff dolomitic microsparite, 1% buff microsparitic dolostone, 10% white to brown f xyn anhydrite, 5% dk grey shale, 69% lt buff to brown argil very f to m xyn dolostone w/ shale partings.
- 786.4 m (2580')-5% buff microsparite, 10% buff dolomitic microsparite, 2% lt buff microsparitic f xyn dolostone, 5% white to buff f xyn anhydrite, 3% dk grey shale, 75% lt buff to brown very f to f xyn dolostone.
- 789.4 m (2590')-5% white to buff f xyn anhydrite, 5% buff microsparite, 10% buff dolomitic microsparite, tr pyrite, 10% white to buff f xyn anhydrite, 3% white f(?) xyn gypsum, 1% dk grey shale, 66% buff to brown f to m xyn dolostone.
- 792.5 m (2600')-2% buff microsparite, 5% white to buff f xyn anhydrite, 2% buff dolomitic

- (f xyn) microsparite, 1% buff microsparitic f xyn dolostone, 1% dk grey shale (as shale partings), 89% white to brown f to m xyn dolostone, tr lt olive rd c sand-sized chert gns, tr white f xyn gypsum.
- 795.5 m (2610')-5% buff microsparite, 1% white f xyn gypsum, 3% buff dolomitic microsparite, 3% opaque white gypsum xtal frags to 1 mm, 1% white to buff f xyn anhydrite, 1% dk grey shale, 86% white to brown f xyn dolostone w/ up to 10% interxyn porosity.
- 798.6 m (2620')-10% buff microsparite, 5% buff dolomitic microsparite, 5% white to brown f xyn anhydrite, 2% buff microsparitic f xyn dolostone, 2% dk grey shale, 2% white opaque gypsum xtal frags to 1 mm, 74% white to buff f to m xyn dolostone.
- 801.6 m (2630')-tr ossicles, 3% buff microsparite, 1% opaque white gypsum xtal frags to 1 mm, 3% buff dolomitic microsparite, 2% buff microsparitic f xyn dolostone, 91% white to brown f to m xyn dolostone w/ up to 10% interxyn porosity.
- 804.7 m (2640')-4% opaque white gypsum xtals to 1 mm, 5% white to brown f xyn anhydrite, 15% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, tr rd c sand-sized monoxyn quartz gns, tr dk grey shale, 66% white to brown f xyn dolostone w/ up to 10% porosity, tr bitumen.
- 807.7 m (2650')-tr dk grey chert, 15% white to brown f xyn anhydrite, tr buff microsparite, 2% buff dolomitic microsparite, tr buff microsparitic very f to f xyn dolostone, 83% buff very f-f xyn dolostone.
- 810.8 m (2660')-10% buff microsparite, 5% buff dolomitic microsparite, 15% white to brown f xyn anhydrite, 70% buff to brown very f to f xyn dolostone w/ up to 15% porosity.
- 813.8 m (2670')-2% lt buff microsparite, 10% buff dolomitic microsparite, 10% white to brown f xyn anhydrite, 2% buff microsparitic f xyn dolostone, 3% thin dk grey shale partings, 72% lt buff to brown very f to f xyn dolostone, in part anhydritic, 1% white gypsum xtal frags.
- 816.9 m (2680')-5% buff microsparite, 10% buff dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, 5% white to brown f xyn anhydrite, tr clear selenite, tr pyrite, 75% buff to brown f to m xyn dolostone w/ tr ossicles, minor bitumen fills pores.
- 819.9 m (2690')-5% buff microsparite, 10% buff dolomitic microsparite, 3% buff microsparitic dolostone, 4% white to brown anhydrite, 1% white gypsum xtal frags, 76% white to brown very f to m xyn dolostone, tr buff chert and tr rd c gn sand-sized chert gns, 1% dk grey shale.
- 823.0 m (2700')-5% buff microsparite, 10% buff dolomitic (f xyn) microsparite, 10% microsparitic very f to f xyn dolostone, tr lt brown rd chert gns to 3.3 mm in size, 5% white to buff f xyn anhydrite, 68% buff to brown f to m xyn dolostone, tr buff chert, 2% white gypsum (in part filling fractures).
- 826.0 m (2710')-3% buff microsparite, 10% buff dolomitic (f xyn) microsparite, 10% buff microsparitic f xyn dolostone, 2% white to buff f xyn anhydrite, tr dk grey shale, tr clear anhydrite xtal frags to 0.5 mm in size, 75% white to brown f to m xyn dolostone.
- 829.1 m (2720')-20% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 10% microsparitic f xyn dolostone, tr white to buff f xyn anhydrite, tr lt buff chert, 5% white to brown f xyn anhydrite, 60% buff very f to m xyn dolostone, tr dk grey shale, tr white gypsum.
- 832.1 m (2730')-5% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, 2% white to buff f xyn anhydrite, 3% white gypsum, tr dk grey shale, 80% buff very f to m xyn dolostone, tr white gypsum.
- 835.2 m (2740')-20% buff microsparite, 10% buff dolomitic (f xyn) microsparite, tr rd m gn sand-sized quartz gns, 5% buff microsparitic f xyn dolostone, 10% white gypsum, 3% white to buff anhydrite, 51% buff very f to m xyn dolostone, 1% dk grey shale.
- 838.2 m (2750')-13% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 5% buff microsparitic f xyn dolostone, 30% white to buff f xyn anhydrite, 45% buff to brown very f to m xyn dolostone, 2% white gypsum, tr high-amplitude stylolites.
- 841.2 m (2760')-20% buff microsparite, 5% buff dolomitic microsparite, 3% buff microsparitic f xyn dolostone, 10% white to buff f xyn anhydrite, 1% white gypsum, 1% dk grey shale, 60% buff to brown f to m xyn dolostone.

- 844.3 m (2770')-20% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 5% microsparitic f xyn dolostone, 10% clear to buff anhydrite, 1% dk grey shale, 59% buff to brown very f to m xyn dolostone w/ thin shale partings.
- 847.3 m (2780')-60% buff microsparite, 38% vlt buff very f xyn dolostone, 1% white anhydrite, 1% white gypsum.
- 850.4 m (2790')-35% lt brown microsparite, 5% lt brown dolomitic (f xyn) microsparite, 3% buff microsparitic/sparry f xyn dolostone, tr buff chert, 3% white to buff f xyn anhydrite, tr selenite, tr dk grey shale, 54% lt buff poorly indurated very f to f xyn dolostone.
- 853.4 m (2800')-10% buff microsparite, 10% buff dolomitic (f xyn) microsparite, 5% buff microsparitic/sparry f xyn dolostone, tr buff chert, 10% white to buff f xyn anhydrite, 64% lt buff to buff f xyn dolostone, tr dk grey shale, 1% white gypsum.
- 856.5 m (2810')-3% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 3% buff microsparitic/sparry f xyn dolostone, tr buff chert, 3% white to buff f xyn anhydrite, 85% buff f xyn dolostone w/ up to 25% interxyn porosity, 1% white gypsum.
- 859.5 m (2820')-3% buff microsparite, 2% buff dolomitic (f xyn) microsparite, 5% microsparitic/sparry f xyn dolostone, tr rd c sand-sized monoxyn quartz gns, 10% white to buff f xyn anhydrite, 78% lt buff f xyn dolostone w/ up to 25% interxyn porosity, tr lt buff chert, 2% white opaque gypsum.
- 862.6 m (2830')-10% buff microsparite, 3% buff dolomitic (f xyn) microsparite, 10% buff microsparitic/sparry f xyn dolostone, 5% white to buff f xyn anhydrite, tr dk grey shale, 70% lt buff to buff very f to f xyn dolostone, tr pyrite, 2% opaque white gypsum.
- 865.6 m (2840')-10% buff microsparite, 5% buff dolomitic (f xyn) microsparite/f xyn sparite, 15% buff to brown microsparitic/sparry f xyn dolostone, 5% white f xyn anhydrite, tr dk grey shale, tr white chert, 2% white gypsum, 63% lt buff f xyn dolostone w/ up to 15% interxyn porosity.
- 868.7 m (2850')-15% buff microsparite, 3% buff dolomitic (f xyn) microsparite/f xyn sparite, 30% lt buff to buff microsparitic/sparry f xyn dolostone, 10% white to buff f xyn anhydrite, tr ossicles, 1% dk grey shale, 39% buff to brown very f to f xyn dolostone, 2% white gypsum.
- 871.7 m (2860')-15% buff microsparite, 3% buff dolomitic microsparite, 10% buff to brown microsparitic/sparry f xyn dolostone, 10% white to buff f xyn anhydrite, 60% buff f xyn dolostone, 2% white gypsum, tr buff chert.
- 874.8 m (2870')-10% buff microsparite, 5% buff dolomitic (very f to f xyn) microsparite, 5% microsparitic very f to f xyn dolostone, 3% white to buff f xyn anhydrite, 73% buff very f to f xyn dolostone, 4% white gypsum, tr dk grey shale, tr ossicles(?).
- 877.8 m (2880')-30% buff microsparite, 2% dolomitic microsparite, 2% buff microsparitic/sparry f xyn dolostone, tr anhydrite, 2% white gypsum, 64% buff to brown very f to f xyn dolostone.
- 880.9 m (2890')-25% buff microsparite, 5% dolomitic microsparite, tr brown chert, 5% sparry f xyn dolostone, 5% white to buff f xyn anhydrite, 57% buff to brown f xyn dolostone, 3% white gypsum.
- 883.9 m (2900')-20% buff microsparite, 3% buff dolomitic microsparite, 10% microsparitic/sparry f xyn dolostone, tr white to buff f xyn anhydrite, 65% buff to brown f to m xyn dolostone, 2% white gypsum.
- 887.0 m (2910')-10% buff microsparite, 3% buff dolomitic f xyn sparite, 20% brown microsparitic/sparry f to m xyn dolostone, tr ossicles, 5% white to buff f xyn anhydrite, 5% white gypsum, tr dk grey shale, 57% brown f to m xyn dolostone.
- 890.0 m (2920')-10% buff microsparite, 5% buff dolomitic (f to m xyn) microsparite, 10% brown microsparitic/sparry f to m xyn dolostone, 3% white f xyn anhydrite, 5% white gypsum, 67% brown f to m xyn dolostone, tr pyrite, tr dk grey shale.
- 893.1 m (2930')-15% buff microsparite, 5% buff dolomitic (f xyn) microsparite, tr pyrite, 20% lt brown sparry f xyn dolostone, 3% white f xyn gypsum, 2% white to buff f xyn anhydrite, 55% lt brown f to m xyn dolostone.
- 896.1 m (2940')-5% buff microsparite, 3% buff dolomitic microsparite, 15% buff to brown f to m xyn dolostone, 1% white f xyn anhydrite, 63% brown f to m xyn dolostone, tr

- pyrite, 13% white f xyn gypsum.
- 899.2 m (2950')-4% buff microsparite, 2% buff dolomitic microsparite, 25% lt brown microsparitic f to m xyn dolostone, 3% white gypsum, 66% brown f to m xyn dolostone, tr pyrite, tr white to buff f xyn anhydrite.
- 902.2 m (2960')-5% buff microsparite, 5% buff dolomitic microsparite/sparite, 15% microsparitic/sparry f xyn dolostone, tr pyrite, 2% white to buff f xyn anhydrite, 4% white gypsum, 69% lt brown f to m xyn dolostone.
- 905.3 m (2970')-10% buff microsparite, tr buff dolomitic microsparite, 40% buff microsparitic/sparry f xyn dolostone, 40% brown very f to m xyn dolostone, tr dk grey shale, 10% white gypsum.
- 908.3 m (2980')-tr dk grey shale, 10% buff microsparite, 20% lt buff f xyn sparite, 2% buff dolomitic microsparite, 2% white to buff f xyn anhydrite, 1% clear selenite, 10% gypsum, 55% brown f to m xyn dolostone, tr buff chert.
- 911.4 m (2990')-15% buff microsparite, 5% buff dolomitic f xyn sparite, 35% brown sparry f xyn dolostone, 5% white gypsum, tr pyrite, 39% brown f to m xyn dolostone, tr dk grey shale, 1% white to buff anhydrite.
- 914.4 m (3000')-10% buff microsparite, 5% clear f xyn sparite, 10% lt brown sparry f xyn dolostone, 75% white to brown very f to m xyn dolostone, tr pyrite, tr dk grey shale, tr white gypsum, tr anhydrite, tr selenite.
- 917.4 m (3010')-15% buff microsparite, tr ossicles, tr pyrite, 15% brown sparry f xyn dolostone, 70% brown f xyn dolostone.
- 920.5 m (3020')-5% buff microsparite, 20% buff sparry f xyn dolostone, 75% white to buff very f to f xyn dolostone, tr white gypsum, tr white to buff f xyn anhydrite.
- 923.5 m (3030')-40% buff microsparite, 15% buff sparry f xyn dolostone, 40% brown f xyn dolostone, 5% white gypsum.
- 926.6 m (3040')-10% buff microsparite, 10% buff sparry dolostone, 15% white to buff anhydrite, 3% white gypsum, 58% brown f to m xyn dolostone, tr pyrite, 3% clear spar.
- 929.6 m (3050')-tr buff microsparite, 10% white to buff f xyn anhydrite, 5% buff to brown sparry f xyn dolostone, 3% clear anhydrite xtal frags, 82% white to brown very f to f xyn dolostone, tr white gypsum.

UNIT D (932-1000 m, 3058-3281')

- 932.7 m (3060')-tr lt buff chert, 10% buff sparry f xyn dolostone, 3% white to buff f xyn anhydrite, 87% white to brown very f to f xyn dolostone.
- 935.7 m (3070')-10% white to buff f xyn anhydrite, 5% lt buff sparite, 85% white to brown very f to f xyn dolostone, tr dk grey shale.
- 938.8 m (3080')-tr dk grey shale, tr lt buff chert, tr dolomitic sparite, 1% sparite, 94% vlt buff to brown very f to f xyn dolostone, 5% white to buff f xyn anhydrite.
- 941.8 m (3090')-tr buff sparite, 1% buff sparry f xyn dolostone, 4% white to buff f xyn anhydrite, tr clear selenite, tr white opaque gypsum, tr dk grey shale, 95% brown very f to m xyn dolostone, tr clear anhydrite xtal frags to 2 mm in size.
- 944.9 m (3100')-tr dk grey shale, 1% buff microsparite, 3% sparry f to m xyn dolostone, 5% white to buff f xyn anhydrite, tr white gypsum, 91% brown very f to m xyn dolostone.
- 947.9 m (3110')-tr buff microsparite, 3% white to buff f xyn anhydrite, tr clear selenite, 97% brown very f to m xyn dolostone, tr white opaque gypsum.
- 951.0 m (3120')-tr pyrite, 5% buff microsparite, 5% brown f to m xyn sparry dolostone, 1% white to buff f xyn anhydrite, tr gypsum, 89% brown f to m xyn dolostone.
- 954.0 m (3130')-1% buff microsparite, 1% buff sparry f xyn dolostone, tr pyrite, 1% clear selenite, 2% white to f xyn anhydrite, tr m to c xyn sparite, 95% brown very f to m xyn dolostone, tr gypsum, tr dk grey shale.
- 957.1 m (3140')-2% buff microsparite, 2% white gypsum, tr dk grey shale, 1% buff dolomitic sparite, 1% buff sparry f xyn dolostone, 94% brown f to m xyn dolostone.
- 960.1 m (3150')-tr dk grey shale, 3% buff microsparite, 1% buff sparry f xyn dolostone, 1% white to buff f xyn anhydrite, tr dolomitic (f xyn) microsparite, 94% brown f to m xyn dolostone, tr dk grey shale, 1% white gypsum.

- 963.2 m (3160')-5% buff microsparite, 3% buff dolomitic (f xyn) microsparite, 5% buff to brown sparry f xyn dolostone, tr white to buff f xyn anhydrite, tr white gypsum, 87% brown very f to m xyn dolostone.
- 966.2 m (3170')-1% buff microsparite, tr m to c xyn sparite, 1% buff dolomitic (f xyn) microsparite, 1% buff to brown sparry f xyn dolostone, tr lt buff chert, tr white to buff f xyn anhydrite, 3% opaque white gypsum xtal frags, 94% brown f to m xyn dolostone.
- 969.3 m (3180')-tr clear selenite, tr buff microsparite, tr dolomitic (f xyn) microsparite, tr brown sparry f xyn dolostone, 100% brown f to m xyn dolostone, tr white to buff f xyn anhydrite.
- 972.3 m (3190')-5% buff microsparite, tr clear selenite xtal frags, tr white to buff anhydrite, 95% brown very f to m xyn dolostone.
- 975.4 m (3200')-5% buff microsparite, tr pyrite, 1% opaque white gypsum xtal frags, tr white to buff f xyn anhydrite, tr sparry dolostone, 93% buff to brown f to m xyn dolostone, 1% m to c xyn clear dolospar.
- 978.4 m (3210')-4% buff microsparite, tr pyrite, tr white gypsum xtal frags, tr white to buff f xyn anhydrite, 96% brown f to m xyn dolostone, tr dolomitic (f xyn) sparite.
- 981.5 m (3220')-5% buff microsparite, 1% white f xyn anhydrite, tr clear selenite, 94% white to brown very f to f xyn dolostone, tr pyrite, tr dk grey shale partings.
- 984.5 m (3230')-5% buff microsparite, 5% buff dolomitic (f xyn) microsparite, tr dk grey shale, 89% buff to brown f to m xyn dolostone, 1% white gypsum xtal frags, tr clear selenite.
- 987.6 m (3240')-tr clear selenite, tr dk grey shale, 5% buff dolomitic microsparite, 10% white f xyn anhydrite, 85% buff to brown f to m xyn dolostone.
- 990.6 m (3250')-1% white to buff anhydrite, 3% buff microsparite, tr dk grey shale, 96% lt buff to brown very f to f xyn dolostone, tr white gypsum, tr pyrite.
- 993.6 m (3260')-tr dk grey shale, 10% buff microsparite, 5% buff dolomitic (f xyn) microsparite, 85% buff to brown very f to f xyn dolostone, tr buff chert, tr pyrite.
- 996.7 m (3270')-20% buff microsparite, tr white c xyn gypsum xtal frags, 3% white to buff f xyn anhydrite, 77% buff to brown very f to f xyn dolostone.
- 999.7 m (3280')-1% white to brown f xyn anhydrite, tr clear selenite, 15% dolomitic (f xyn) microsparite, 84% lt buff to brown very f to f xyn dolostone.

UNIT C (1000-1028 m, 3281-3373')

- 1002.8 m (3290')-tr clear selenite, tr dk grey shale, 100% buff very f xyn anhydrite, tr buff m xyn dolostone.
- 1005.8 m (3300')-1% dk grey shale, 1% white to buff f xyn anhydrite, 98% lt buff to brown very f xyn anhydrite.
- 1008.9 m (3310')-99% lt brown very f xyn anhydrite, 1% siltstone, tr very f xyn white gypsum, tr selenite xtals.
- 1011.9 m (3320')-aa, anhydrite is very f xyn (mode 10 μ m) w/ minor amount to m xyn, selenite to 1.5 mm.
- 1015.0 m (3330')-99% brown very f xyn anhydrite, 1% spar, tr white gypsum.
- 1018.0 m (3340')-aa.
- 1021.1 m (3350')-99% lt brown very f xyn anhydrite, 1% white very f xyn gypsum, tr selenite.
- 1024.1 m (3360')-aa.
- 1027.2 m (3370')-97% anhydrite aa, 3% very f xyn white gypsum, tr black shale, tr selenite.

UNIT B (1028-1142 m, 3373-3747')

- 1030.2 m (3380')-97% lt brown very f xyn dolostone and 3% white very f xyn gypsum.
- 1033.3 m (3390')-90% lt brown very f to f xyn dolostone w/ 5% interxyn porosity, minor proportion cemented by spar, some contains gypsum laths on fracture surfaces, 5% white aphanocrystalline to very f xyn gypsum, tr selenite, tr black shale, tr black interxyn bitumen.
- 1036.3 m (3400')-100% lt brown very f to m xyn dolostone w/ 5% porosity, tr spar, bitumen.
- 1039.4 m (3410')-95% very f to f xyn dolostone w/ 5% interxyn porosity, 5% gypsum.

- 1042.4 m (3420')-5% aphanoxyn white gypsum, 94% very f to f xyn dolostone aa w/ 1% quartz gns to 700 μ m in size, tr black shale, tr selenite.
- 1045.5 m (3430')-5% white aphanoxyn/very f xyn gypsum, tr calcite, 1% quartz gns, 94% lt brown f to m xyn dolostone w/ 5% interxyn porosity, tr brittle black bitumen.
- 1048.5 m (3440')-aa w/ tr black shale.
- 1051.6 m (3450')-94% lt brown f xyn dolostone w/ 5% interxyn porosity, 5% white aphanoxyn/very f xyn gypsum, 1% quartz gns some of which are rd, tr sparite.
- 1054.6 m (3460')-5% white aphanoxyn/very f xyn gypsum, 94% f xyn dolostone w/ 5% interxyn porosity, 1% quartz, tr bitumen.
- 1057.7 m (3470')-aa.
- 1060.7 m (3480')-97% f xyn dolostone w/ 5% interxyn porosity, 3% white aphano- to very f xyn gypsum, tr selenite and quartz gns.
- 1063.8 m (3490')-95% lt brown f xyn dolostone w/ 5% porosity, 5% white gypsum aa, tr pyrite, tr black silty shale.
- 1066.8 m (3500')-91% f xyn dolostone w/ 5% porosity, 8% white gypsum aa, 1% selenite, tr black shale.
- 1069.8 m (3510')-95% buff to lt brown f xyn dolostone w/ 10% porosity, 5% white aphano to f xyn gypsum, tr black shale, tr minor dolostone w/ gypsum lining fractures.
- 1072.9 m (3520')-aa but dolostone is f to m xyn and is vlt brown.
- 1075.9 m (3530')-as for 1072.9 m (3520').
- 1079.0 m (3540')-95% vlt brown f to m xyn dolostone w/ 5% porosity/spar cement, 5% white aphano to very f xyn gypsum.
- 1082.0 m (3550') and 1085.1 m (3560')-aa.
- 1088.1 m (3570')-100% buff f to m xyn dolostone w/ 10% porosity, contains low-amplitude stylolites, tr buff chert, spar and black shale.
- 1091.2 m (3580')-15% waxy lt green shale, 2% lt brown shale, tr quartz, 81% vlt brown f xyn dolostone w/ 5% porosity, 2% white aphano/very f xyn gypsum.
- 1094.2 m (3590')-94% lt brown f xyn dolostone w/ 5% porosity, 3% green shale, 3% white gypsum aa.
- 1097.3 m (3600')-95% vlt brown f xyn dolostone w/ 5% porosity, 5% white gypsum, tr bitumen and green shale.
- 1100.3 m (3610')-98% vlt brown f xyn dolostone w/ 5% porosity, 2% white gypsum, tr black shale, tr selenite, tr quartz.
- 1103.4 m (3620')-95% vlt brown very f to f xyn dolostone w/ 10% porosity, 5% white gypsum, tr green shale and quartz gns.
- 1106.4 m (3630') & 1109.5 m (3640')-aa.
- 1112.5 m (3650')-aa w/ tr selenite.
- 1115.6 m (3660')-97% vlt brown f xyn dolostone w/ 5% interxyn porosity, 3% white gypsum.
- 1118.6 m (3670')-10% dolomitic microsparite, 87% vlt brown f xyn dolostone w/ 5% porosity, 3% white gypsum, tr black shale.
- 1121.7 m (3680')-95% lt brown f xyn dolostone w/ 10% porosity, 5% white gypsum.
- 1124.7 m (3690')-99% brownish grey f xyn dolostone w/ 10% interxyn porosity, 1% white gypsum, tr interxyn bitumen.
- 1127.8 m (3700')-99% sl brownish grey f xyn dolostone w/ 5% porosity and 2% interxyn bitumen, 1% white gypsum.
- 1130.8 m (3710') & 1133.9 m (3720')-aa
- 1136.9 m (3730')-no returns.
- 1140.0 m (3740')-as for 1127.8 m (3700').

UNIT A (1142-1265 m, 3747-4150')

- 1143.0 m (3750')-aa.
- 1146.0 m (3760')-85% sparry (f xyn) f xyn dolostone w/ 5% interxyn porosity, 15% f xyn spar.
- 1149.1 m (3770')-99% wk brownish-grey sparry (f xyn) dolostone w/ 10% porosity, 1% white gypsum.

- 1152.1 m (3780')-aa but 2% gypsum, tr quartz.
 1155.2 m (3790')-aa.
 1158.2 m (3800')-95% lt brownish grey very f to f xyn dolostone and sparry very f to f xyn dolostone w/ 5% interxyn porosity, 5% white microspar, tr quartz, tr interxyn bitumen.
 1161.3 m (3810')-90% lt to m brownish grey variously calc f xyn dolostone w/ 5% porosity, 10% microsparite.
 1164.3 m (3820')-90% sparry f to m xyn dolostone w/ 10% interxyn porosity, 10% microsparite.
 1167.4 m (3830')-aa w/ tr chert.
 1170.4 m (3840')-as for 1164.3 m (3820').
 1173.5 m (3850')-80% wk brownish grey sparry f xyn dolostone w/ 5% interxyn porosity, 20% white microsparite/f xyn sparite.
 1176.5 m (3860')-70% lt brown very f to f xyn sparry dolostone and dolostone, 30% vlt grey micritic microsparite, tr quartz.
 1179.6 m (3870')-aa but 20% very f to f xyn dolostone, 30% sparry dolostone, 50% micritic microsparite.
 1182.6 m (3880')-as for 1179.6 m (3870'), low-amplitude stylolites in ls.
 1185.7 m (3890')-aa w/ tr quartz.
 1188.7 m (3900')-30% lt brownish grey soft microsparite, 70% very f to f xyn sparry dolostone w/ tr ossicles and ostracods, minor bitumen and pyrite, low-amplitude stylolites.
 1191.8 m (3910')-aa.
 1194.8 m (3920')-aa w/ tr quartz and no ostracods.
 1197.9 m (3930')-aa.
 1200.9 m (3940')-aa w/ tr gypsum and very f to f gn well-cemented sandstone, tr gns of very f xyn granite.
 1204.0 m (3950')-60% lt brown very f to f xyn variously calc dolostone, tr ossicles and low-amplitude stylolites, 40% sl brownish vlt grey microsparite, tr white gypsum.
 1207.0 m (3960')-49% dolostone aa, 49% soft microsparite aa, tr ossicles, 1% white gypsum, 1% very f gn quartz arenite (silica-cemented), tr green shale, tr black chert.
 1210.1 m (3970')-50% dolostone and 50% microsparite aa.
 1213.1 m (3980')-30% lt buff dolomitic f xyn sparite, 68% dolostone and sparry dolostone, tr ossicles, tr bitumen, minor low-amplitude stylolites, 2% white gypsum.
 1216.2 m (3990')-50/50 dolostone and microsparite aa, tr ossicles in dolostone, microsparite is moderately indurated and dolostone is well indurated.
 1219.2 m (4000')-50% lt buff soft microsparite, 50% m grey very f to f xyn dolostone and sparry dolostone w/ tr ossicles.
 1222.2 m (4010')-60% dolostone aa, 40% microsparite aa.
 1225.3 m (4020')-aa w/ tr siltstone and gypsum, 1% ossicles.
 1228.3 m (4030')-60% ls aa, 40% dk and sparry dolostone aa, tr ossicles, dolostone w/ gypsum lining fractures.
 1231.4 m (4040'), 1234.4 m (4050')-aa.
 1237.5 m (4060')-aa w/ 1% dk brown bitumenous dolostone.
 1240.5 m (4070')-80% buff to lt brownish grey very f to f xyn ls (well indurated), 1% ossicles, tr pyrite, 19% dolostone.
 1243.6 m (4080')-79% lt buff soft microsparite/f xyn sparite, 20% brown f xyn dolostone and sparry dolostone, 1% ossicles.
 1246.6 m (4090')-aa w/ tr gypsum and quartz.
 1249.7 m (4100')-70% ls aa, 30% dolostone aa.
 1252.7 m (4110')-aa, buff dolostone is in part dk brown and contains tr pyrite.
 1255.8 m (4120')-60% soft vlt grey ls aa, 40% brownish dk grey very f to f xyn dolostone, tr ossicles, tr gypsum, tr low-amplitude stylolites.
 1258.8 m (4130')-aa.
 1261.9 m (4140')-25% greenish grey silty/argil dolostone, 55% microsparite/f xyn sparite aa, 20% very f to f xyn dolostone aa, tr ossicles.

IRENE BAY FORMATION (1265-1286 m, 4150-4219')

- 1264.9 m (4150')-aa.
- 1268.0 m (4160')-aa, tr ossicles, tr pyrite, tr low-amplitude stylolites.
- 1271.0 m (4170') & 1274.1 m (4180')-aa.
- 1277.2 m (4190')-50% lt brownish grey very f to f xyn dolostone and sparry dolostone, 50% soft vlt grey argil/silty microsparite/f xyn sparite, tr pyrite.
- 1280.2 m (4200')-aa, tr ossicles.
- 1283.2 m (4210')-70% lt greenish grey sparry mudstone, 30% vlt grey argil microsparite.

THUMB MOUNTAIN FORMATION (1286-1399 m, 4219-4590')

- 1286.3 m (4220')-80% sparry mudstone aa, 20% argil microsparite aa.
- 1289.3 m (4230')-25% lt greenish grey sparry mudstone, 75% sparry dolostone aa, tr brachs, tr pyrite.
- 1292.4 m (4240')-10% lt greenish grey sparry mudstone, 90% very f to f xyn sparite and sparry dolostone, tr ossicles, tr ostracods, tr pyrite.
- 1295.4 m (4250')-45% sparry dolostone, 50% very f to f xyn sparite, tr ossicles, tr f costate brachs(?), 5% lt greenish grey sparry mudstone aa.
- 1298.4 m (4260')-60% very f to f xyn sparite, 5% lt greenish-grey sparry mudstone aa, tr ossicles, 35% very f to f xyn lt brownish grey dolostone, tr ossicles, tr f costate brachs, tr pyrite and bitumen.
- 1301.5 m (4270')-18% lt brownish grey very f xyn sparry dolostone, 80% vlt grey microsparite, 2% vlt green mudstone aa.
- 1304.5 m (4280')-60% soft microsparite/f xyn sparite aa, 38% dolostone and sparry dolostone aa, 2% lt greenish grey sparry mudstone, tr ossicles.
- 1307.6 m (4290')-95% microsparite/f xyn sparite, 1% ossicles, 4% lt greenish grey mudstone, tr ostracods.
- 1310.6 m (4300')-100% microsparite, scattered low-amplitude stylolites, tr ossicles, tr ostracods.
- 1313.7 m (4310')-95% microsparite/f xyn sparite, 1% ossicles, 5% lt greenish grey sparry mudstone, tr f costate brachs.
- 1316.7 m (4320')-99% soft lt grey microsparite/f xyn sparite, 1% lt greenish grey sparry mudstone aa.
- 1319.8 m (4330')-20% f xyn lt brown sparry dolostone, 80% soft vlt grey microsparite, tr f costate (w/ f growth lines) brachs(?), tr ossicles.
- 1322.8 m (4340')-100% lt grey to lt brown microsparite aa w/ tr ostracods, tr ossicles, tr costate brachs 1 mm in size, minor low-amplitude stylolites, tr quartz.
- 1325.9 m (4350')-10% lt brown f xyn sparry dolostone, 90% lt grey microsparite/f xyn sparite, tr ossicles.
- 1328.9 m (4360')-91% vlt grey to lt brown microsparite, 5% very f to f xyn brown dolostone, 3% lt greenish grey mudstone aa, tr f costate brachs, 1% ossicles, tr brown shale.
- 1332.0 m (4370')-90% microsparite aa, 8% sparry dolostone aa, 2% lt greenish grey mudstone aa, 1% ossicles, tr quartz, tr gypsum.
- 1335.0 m (4380')-90% microsparite aa, 10% dolostone aa, 1% ossicles, one 1.5 mm long smooth-shelled ostracod, tr lt green mudstone aa.
- 1338.1 m (4390')-100% soft vlt grey to lt brown microsparite aa, tr f costate brachiopods, tr m grey silty shale, tr ossicles, tr quartz.
- 1341.1 m (4400')-90% microsparite aa, 10% dolostone and sparry dolostone aa, tr ossicles, tr f costate brachs.
- 1344.2 m (4410')-100% microsparite aa w/ minor sparry dolostone stringers, tr ossicles, tr lt greenish grey mudstone aa, tr ostracods.
- 1347.2 m (4420')-aa w/ tr f costate brachs, 1% ossicles.
- 1350.3 m (4430')-100% microsparite aa, tr ostracods and ossicles.
- 1353.3 m (4440')-90% vlt grey (soft) brownish grey microsparite aa, 10% f xyn sparry dolostone and dolostone, 2% ossicles, tr quartz.

- 1356.4 m (4450')-aa w/ tr pyrite.
 1359.4 m (4460')-aa w/ low-amplitude stylolites and dolomitic stringers in microsparite, 1% ossicles, tr rd quartz gns.
 1362.5 m (4470')-90% microsparite aa, 10% sparry dolostone aa, minor low-amplitude stylolites, tr green mudstone aa, minor f xyn dolostone stringers, tr ossicles.
 1365.5 m (4480')-aa w/ 2% dk brown shale.
 1368.6 m (4490')-90% lt grey soft argil microsparite aa, 5% sparry f xyn dolostone, 5% dk brown argil f xyn sparite, minor low-amplitude stylolites, tr f costate brachs.
 1371.6 m (4500')-aa w/ tr quartz gns and ossicles, tr pyrite, tr silty (quartzose) microsparite.
 1374.6 m (4510')-as for 1368.6 m (4490').
 1377.7 m (4520')-20% brownish grey argil f xyn sparite, 10% brownish dk grey mudstone, 10% sparry f xyn dolostone, 60% soft lt grey to brown argil microsparite, tr siltstone, tr ossicles.
 1380.7 m (4530')-aa.
 1383.8 m (4540')-aa w/ tr bitumen.
 1386.8 m (4550')-90% vlt grey to brown microsparite, 10% f to m xyn sparry dolostone, tr ossicles.
 1389.9 m (4560')-5% dk grey siltstone, 90% lt grey to lt brown microsparite containing tr smooth ostracods (0.5 mm in size), 5% dolomitic (m xyn) f xyn sparite, tr green shale, tr quartz, tr pyrite.
 1392.9 m (4570')-10% dolomitic (f xyn) microsparite, 15% sparry m xyn dolostone, 5% dk grey siltstone, 70% lt brownish grey microsparite w/ dolomitic stringers.
 1396.0 m (4580')-60% sparry f xyn dolostone, 37% soft lt grey to brown microsparite, tr bitumen, 3% dk grey siltstone, tr ossicles, tr shale, tr quartz gns.

BAY FIORD FORMATION (1399-1596 m, 4590-5236')

- 1399.0 m (4590) & 1402.1 m (4600')-aa.
 1405.1 m (4610')-10% microsparite, 82% m xyn dolostone, 5% dk grey siltstone, 3% lt greenish grey shale, tr gypsum, tr selenite, tr quartz.
 1408.2 m (4620')-10% dk grey silty shale, sparry f xyn dolostone, 20% lt grey microsparite, 5% dk grey siltstone and lt greenish grey shale, 65% sparry f xyn dolostone.
 1411.2 m (4630')-15% black shale, 10% lt grey microsparite, 75% white to brown f xyn dolostone, tr pyrite.
 1414.3 m (4640')-20% lt grey to brown microsparite, 80% sl greenish grey dolomitic shale, tr selenite, tr pyrite.
 1417.3 m (4650')-aa.
 1420.4 m (4660')-10% lt grey to brown microsparite, 30% dk grey to sl greenish grey shale and siltstone, 59% very f xyn dolostone, 1% white gypsum.
 1423.4 m (4670')-90% grey silty (quartzose) argil very f xyn dolostone, 5% lt grey microsparite, 5% lt brown very f to f xyn dolostone.
 1426.5 m (4680')-95% grey silty (quartzose) argil dolostone aa, 5% lt brown very f to f xyn dolostone, tr pyrite, tr quartz, tr lt brown dolomitic anhydrite.
 1429.5 m (4690')-80% grey silty (quartzose) argil dolostone, 20% lt brown very f to f xyn dolostone.
 1432.6 m (4700')-2% lt brown anhydrite, 8% white anhydrite, 85% lt greenish grey dolomitic claystone, 5% lt brown very f to f xyn dolostone.
 1435.6 m (4710')-40% white to lt brown anhydrite, 60% dolomitic claystone aa.
 1438.7 m (4720')-30% white to lt brown anhydrite aa, 70% lt greenish grey to grey dolomitic claystone aa.
 1441.7 m (4730')-aa w/ 1% vlt grey microsparite.
 1444.8 m (4740')-20% sl greenish grey dolomitic mudstone, 1% white gypsum, tr selenite, 78% lt brown f xyn dolostone, 1% microsparite.
 1447.8 m (4750')-60% lt brown f xyn dolostone, 40% greenish grey dolomitic mudstone, tr anhydrite, tr pyrite, tr quartz.
 1450.9 m (4760')-90% lt brown f xyn dolostone, 10% dk brown shale.

- 1453.9 m (4770')-60% lt brown f xyn dolostone, 40% grey to dk grey argil/silty dolostone.
 1456.9 m (4780')-50% lt brown dolostone aa, 49% argil dolostone, 1% microsparite, tr gypsum, tr pyrite.
 1460.0 m (4790')-3% microsparite, 35% dk grey mudstone aa, 62% very f to f xyn dolostone, tr gypsum, tr pyrite.
 1463.0 m (4800')-90% lt greenish grey argil dolostone, 10% lt brown very f to f xyn dolostone, tr gypsum and anhydrite.
 1466.0 m (4810')-89% lt greenish grey argil dolostone, 10% dolostone aa, 1% white gypsum.
 1469.1 m (4820')-90% sl greenish grey argil very f xyn dolostone, 5% dk grey shale, 5% dolostone aa.
 1472.2 m (4830')-aa w/ tr pyrite & 2% white f xyn anhydrite.
 1475.2 m (4840')-70% lt greenish grey argil very f xyn dolostone, 25% lt brown very f to f xyn dolostone, 2% anhydrite, 3% gypsum.
 1478.3 m (4850')-45% lt greenish grey argil very f xyn dolostone, 50% lt brown very f xyn dolostone, 3% white gypsum, 2% white f xyn anhydrite.
 1481.3 m (4860')-45% lt greenish grey argil dolostone, 45% lt brown very f to f xyn dolostone, 5% brownish dk grey carb very f xyn dolostone, 3% white f xyn anhydrite, 2% white gypsum.
 1484.4 m (4870')-aa.
 1487.4 m (4880')-2% anhydrite, 50% lt greenish grey argil dolostone, 48% very f to f xyn dolostone, tr white gypsum.
 1490.5 m (4890') to 1502.7 m (4930')-aa.
 1505.7 m (4940')-aa w/ tr selenite.
 1508.8 m (4950')-aa, tr quartz, tr ossicles.
 1511.8 m (4960')-70% lt grey dolostone aa, 30% very f to f xyn dolostone, tr anhydrite and dolomitic anhydrite.
 1514.9 m (4970')-5% white anhydrite, 35% lt brown anhydritic very f to f xyn dolostone, 60% lt greenish grey argil very f xyn dolostone.
 1517.9 m (4980')-10% brownish dk grey anhydritic very f xyn dolostone, 5% white f xyn anhydrite, 60% lt greenish grey argil very f xyn dolostone, 25% lt brown anhydritic very f xyn dolostone, tr microsparite.
 1521.0 m (4990')-aa w/ tr white gypsum and 2% anhydrite.
 1524.0 m (5000')-15% white f xyn anhydrite, 10% lt brown anhydrite, 65% lt brown very f xyn variously anhydritic argil dolostone, 10% dk brown dolostone, tr selenite, white translucent gypsum, microsparite.
 1527.1 m (5010') & 1530.1 m (5020')-aa.
 1533.1 m (5030')-2% soft vlt grey microsparite, 48% lt greenish grey argil very f xyn dolostone, 49% lt brown very f xyn dolostone, 1% white anhydrite.
 1536.2 m (5040')-aa w/ tr pyrite.
 1539.2 m (5050')-15% white to lt brown very f to f xyn anhydrite, 85% argil very f xyn dolostone.
 1542.3 m (5060')-3% white f xyn anhydrite, 5% white microsparite, 92% lt brownish to greenish grey very f xyn argil dolostone.
 1545.3 m (5070')-aa.
 1548.4 m (5080')-10% white to lt brown anhydrite, 90% lt greenish grey argil to lt brown very f to f xyn dolostone.
 1551.4 m (5090')-aa.
 1554.5 m (5100')-aa w/ tr gypsum.
 1557.5 m (5110')-aa.
 1560.6 m (5120')-tr clear anhydrite xtals to 1 mm in size, 15% white to lt brown anhydrite, 85% lt brown to lt greenish grey argil very f to f xyn dolostone.
 1563.6 m (5130')-aa w/ 3% white microsparite.
 1566.7 m (5140')-5% anhydrite, 3% white microsparite, 92% lt brown to lt greenish grey argil very f to f xyn dolostone.
 1569.7 m (5150')-30% white to lt brown anhydrite, 70% lt brown to lt green argil very f to f xyn dolostone, tr clear anhydrite xtals to 1 mm in size.

1572.8 m (5160')-40% anhydrite, 60% dolostone aa.
1575.8 m (5170')-80% anhydrite aa, 20% dolostone aa.
1578.9 m (5180')-aa.
1581.9 m (5190')-15% white to lt brown anhydrite, 85% lt greenish grey to lt brown argil very f xyn dolostone.
1585.0 m (5200')-20% anhydrite aa, 80% dolostone aa.
1588.0 m (5210') to 1594.1 m (5230')-aa.

ELEANOR RIVER FORMATION (1596-1659 m, 5236-5443')

1597.2 m (5240')-25% f xyn dolostone, 50% varicoloured very f to f xyn anhydrite, 25% dolostone aa.
1600.2 m (5250')-70% white to lt brown anhydrite, 30% lt brown very f to f xyn dolostone aa.
1603.3 m (5260')-20% anhydrite, 10% anhydritic very f to f xyn dolostone w/ minor interxyn bitumen, 25% sparry f xyn dolostone, 45% varicoloured very f to f xyn dolostone.

The interval from 1606 m (5270') to 1986 m (6515') (total depth) was not described.

XVI. APPENDIX 4, CONODONT DATA FOR THE BRODEUR GROUP

Composite Conodont Sample	Wt. (kg)	Recov- ery	Comp ound Conodonts
A1,1a,2,6,7,9	1.4	Yes	No
A2,3,4,5,6	1.2	No	No
A11a,b,19,32	1.0	Yes	No
A12,12a	1.1	Yes	Yes
A20a,24,28,31,34,35	1.5	Yes	Yes
A32a,b,34,35	1.9	Yes	Yes
A33a	3.7	No	No
A36,38,39,40	1.7	Yes	Yes
A41,42a,47,50b,52b	1.7	Yes	No
A42	2.2	No	No
A43,44,45	1.5	Yes	Yes
A48,49,51	2.0	Yes	Yes
A54,55,58,59	1.6	Yes	Yes
A59	1.9	No	No
A62a,63,64a,b	2.2	No	No
A65,65a,66,69,70,71	2.0	Yes	No
A70,73,74	1.9	No	No
A77,79,80	1.3	Yes	Yes
A81	1.9	Yes	No
A81,84,85	1.1	Yes	No
A88,89,90,95	1.9	No	No
A92	1.7	Yes	No
A97	1.6	Yes	Yes
A98,100d	1.3	No	No
B1,1a,3,9,10,11	2.0	Yes	Yes
B15,18,19,20,21,22	2.3	Yes	Yes
B19,20	1.4	No	No
C1,11,12,13	2.2	Yes	Yes
C7,8	0.6	No	No
C14,15,16,16a,17,17a	1.7	Yes	Yes
C18c,d,19,19a	1.6	Yes	Yes
C21,22,23,24,24a	2.0	No	No
C22,23	1.6	Yes	Yes
C25,26	1.8	Yes	No
C27	2.3	No	No
C28,29	2.2	No	No
C30a,c,31	2.1	No	No
C31a,b,e	2.3	Yes	No
C32a,33,33a,b,c,34	2.8	Yes	Yes
C36,37,38,39	1.5	No	No
C40	1.8	No	No
C45,46,46a,b,50	2.0	No	No
C51,55,56,64,66	2.0	Yes	Yes
C55,57,59	1.5	Yes	Yes
C69,70	0.5	Yes	Yes
D1c,D4	1.5	Yes	Yes
D8,13,18,18a,19,21	1.0	Yes	Yes
DX13	4.0	Yes	No
D24,26,27	1.7	Yes	No

D28,29,31	1.5	No	No
D33,34,35,36,38	2.0	Yes	Yes
DX9	4.3	Yes	Yes
E1,2,4,5,5a	1.7	Yes	Yes
E6,7,8	2.0	Yes	Yes
E8a	4.2	Yes	Yes
E10,12,12a,15	2.2	Yes	Yes
E18,20,21,22	1.7	Yes	Yes
E23,24,25,27	1.6	Yes	Yes
E27a	5.2	Yes	Yes
E30a	3.6	Yes	Yes
E32,33,39b	1.8	Yes	Yes
E33a	4.2	Yes	Yes
E42d,45,47	1.5	Yes	Yes
E47c	4.2	Yes	Yes
E53,54,56,57	1.5	Yes	Yes
E59,61,63,71,73,74,75	0.9	Yes	Yes
E63,68,71	1.0	Yes	Yes
E70	4.7	No	No
E77,78,81,83,85	2.0	Yes	Yes
E78a	3.8	Yes	Yes
E78,81,85	1.5	Yes	Yes
G5,23,35,36	1.2	Yes	Yes
G30	4.0	Yes	Yes
G39d,40,42,43	2.1	Yes	Yes
G45,47	1.9	Yes	Yes
H1,5,22	1.1	No	No
H5,8,11	2.3	No	No
H5a	4.5	No	No
H15,16,18,21,22	2.1	Yes	Yes
H25,25a,26,27	1.6	Yes	Yes
H26,47,50,58,73,78	1.5	No	No
H32,34,41,42,45	1.3	No	No
H45,47,50	1.4	No	No
H45a	4.5	Yes	Yes
H48,50,51,55,58,60	1.5	No	No
H51,55	1.2	Yes	Yes
H62,66,69,72	1.8	Yes	Yes
I2f	1.0	Yes	No
I7,J2,2a,5a	1.9	Yes	Yes
J5	3.00	Yes	Yes
J7,12,21,24,28	1.5	Yes	Yes
J19	4.4	Yes	Yes
J29,33,33a,34,42,45	2.2	Yes	No
J35	4.4	No	No
J46,48,50,52	1.7	Yes	Yes
J53,55,56,58	1.5	Yes	No
J67,70b,71,72,74	2.5	Yes	No
J70	4.8	Yes	No
K2,4,5	1.9	Yes	Yes
L2,2c,3	2.3	Yes	Yes
L2a	3.6	Yes	Yes
L3a	4.1	Yes	Yes
L5,5b,d	1.5	Yes	No
L5c	3.3	Yes	No
L5e,f,g,L7	1.8	Yes	Yes

L7a	3.7	Yes	Yes
L7f,g	2.5	Yes	No?
L7i,j,L7L,n	1.7	Yes	No
L7o	3.6	Yes	Yes
L7p	4.5	No	No
L10b	3.9	No	No
L10f	3.8	Yes	No
L12a	4.1	No	No
L14	4.3	No	No
M1,1a,MX5,6	1.9	Yes	No
MX8	3.6	No	No
MX8a,11a,14,15,15a,16,17	4.0	Yes	Yes
MX14	4.3	Yes	No
MX15	4.5	Yes	No
MX17a	4.2	Yes	No
N2,3,4,4a,5	1.5	Yes	Yes
N2a	3.2	Yes	Yes
N5a	3.8	No	No
N10	3.6	Yes	Yes
N10a,b,11,14	2.1	Yes	Yes
N17,21	1.8	Yes	Yes
Q5	3.9	No	No
Q5a,6,7,7/8,8a	1.5	Yes	No
Q10,10b,14b,15,17	1.9	Yes	No
Q14a	1.9	No	No
R3a	4.2	Yes	Yes
R8a	3.9	Yes	Yes
R14a	4.2	Yes	Yes
R18b	3.8	Yes	Yes
SP1	7.0	Yes	No
Th1	7.8	Yes	Yes

XVII. APPENDIX 5, CONODONTS IDENTIFIED BY G.S. NOWLAN, GEOLOGICAL
SURVEY OF CANADA, ADAPTED FROM GSC REPORT NO. 009-GSN-1986

Note: Conodonts were processed by F. Nentwich in B.D.E. Chatterton's lab at the University of Alberta.

1. Locality: GSC loc. 101712; field sample no. M1,1a, MX5,6 (1.9 kg dissolved); Ship Point Formation, sampled through uppermost 37 m (samples M1 and M1a were taken at sealevel in section M, samples MX5 and 6 were taken 8.1 and 8.8 m respectively asl in section MX); Brodeur Peninsula, Baffin Island, west side of Admiralty Inlet; latitude 73°31'40"N, longitude 85°26'30"W.

The sample yielded 54 moderately well preserved specimens (CAI 1) assignable to:

Drepanoistodus sp. (6 specimens)
Eucharodus parallelus (Branson & Mehl) (20 specimens)
Glyptoconus quadraplicatus (Branson & Mehl) (16 specimens)
Oneotodus costatus Ethington & Brand (4 specimens)
Paltodus bassleri Group sensu Nowlan (1985) (3 specimens)
"*Scolopodus*" *emarginatus* Barnes & Tuke (1 specimen)
"*S.*" *gracilis* Ethington & Clark (1 specimen)
Ulrichodina abnormalis (Branson & Mehl) (1 specimen)
distacodontiform element indet. (1 specimen)
rastrate element indet. (1 specimen)

Remarks: This assemblage includes elements of both Fauna C and Fauna D of Ethington and Clark (1971) and presumably the interval sampled includes the transition. The sample ranges in age from early to mid-Canadian (Early Ordovician).

2. Locality: GSC loc. 101713; field sample no. MX8a,11a,14,15,15a,16,17 (4.0 kg dissolved); Baillarge Formation, member A, about 80.0-85.0 m above base (90.0-94.7 m asl in section MX); Brodeur Peninsula, Baffin Island, west side of Admiralty Inlet; section MX; latitude 73°31'55"N, longitude 85°26'00"W. The sample yielded 49 fragmentary to moderately well preserved specimens (CAI 1) assignable to:

Diaphorodus sp. (11 specimens)
Drepanoistodus? *gracilis* (Branson & Mehl) (4 specimens)
Eucharodus parallelus (Branson & Mehl) (11 specimens)
Oepikodus communis Ethington & Clark (8 specimens)
"*Scolopodus*" *emarginatus* Barnes & Tuke (2 specimens)
"*Scolopodus*" *gracilis* Ethington & Clark (8 specimens)
paltodontiform elements (5 specimens)

Remarks: This assemblage represents Fauna E of Ethington and Clark (1971); the sample is of late Canadian (Early Ordovician) age, but may encompass older strata bearing Fauna D.

3. Locality: GSC loc. 101714; field sample no. MX8 (3.6 kg dissolved); locality as for 101713, but 78.5-80.8 m above base of Baillarge Formation, member A (88.5-90.8 m asl in section MX).

The sample yielded 47 moderately well preserved specimens (CAI 1) assignable to:

Diaphorodus delicatus (Branson & Mehl) (46 specimens)
Drepanoistodus sp. (1 specimen)

Remarks: This assemblage could be from either Fauna D or Fauna E; the sample is of mid to late Canadian (Early Ordovician) age.

4. Locality: GSC loc 101715; field sample no. MX14 (4.3 kg dissolved); locality as for GSC 101713, but 82.0 m above base of Baillarge Formation, member A (92.0 m asl in section MX). The sample yielded 31 moderately well preserved specimens (CAI 1) assignable to:

Diaphorodus delicatus (Branson & Mehl) (18 specimens)
Drepanoistodus sp. (2 specimens)
Eucharodus parallelus (Branson & Mehl) (9 specimens)
Glyptoconus quadraplicatus (Branson & Mehl) (1 specimen)
 paltodontiform element (1 specimen)

Remarks: This assemblage could represent Fauna D or Fauna E; the sample is of mid to late Canadian (Early Ordovician) age.

5. Locality: GSC loc. 101716; field sample no. MX15 (4.5 kg dissolved); locality as for GSC 101713 but 82.5-83.1 m above the base of the Baillarge Formation, member A (92.6-93.1 m asl). The sample yielded 17 moderately well preserved specimens (CAI 1) assignable to:

Diaphorodus akpatokensis? (Barnes) (8 specimens)
D. delicatus (Branson & Mehl) (9 specimens)

Remarks: This assemblage could be from Fauna D or Fauna E; the sample is of mid to late Canadian (Early Ordovician) age.

6. Locality: GSC loc. 101717; field sample no. MX17a (4.2 kg); locality as for GSC 101713 but 83.7-87.0 m above the base of the Baillarge Formation, member A (93.7-97.0 m asl).

The sample yielded 39 moderately well preserved specimens (CAI 1) assignable to:

Diaphorodus akpatokensis (Barnes) (9 specimens)
Drepanoistodus? gracilis (Branson & Mehl) (21 specimens)
Eucharodus parallelus (9 specimens)

Remarks: This assemblage could be from Fauna D or Fauna E; the sample is of mid to late Canadian (Early Ordovician) age.

7. Locality: GSC loc. 101718; field sample no. N2a (3.2 kg dissolved); Baillarge Formation, member A, approximately 55.0-58.0 m above base (1.5-4.3 m asl in section N); Brodeur Peninsula, Baffin Island, west side of Admiralty Inlet; section N; latitude 73°32'00"N, longitude 85°25'30"W.

The sample yielded 50 moderately well preserved specimens (CAI 1) assignable to:

Cristodus? sp. (1 specimen)
Diaphorodus delicatus (Branson & Mehl) (23 specimens)
Drepanoistodus? gracilis (Branson & Mehl) (5 specimens)
Eucharodus parallelus (Branson & Mehl) (13 specimens)
"Scolopodus" emarginatus Barnes & Tuke (2 specimens)
Ulrichodina abnormalis (Branson & Mehl) (2 specimens)
 acontodontiform element indet. (1 specimen)
 paltodontiform element indet. (3 specimens)

Remarks: This assemblage is indicative of Fauna D; the sample is of mid Canadian (Early Ordovician) age.

8. Locality: GSC loc. 101719 (2.1 kg dissolved); field sample no. N10a,b,11,14; locality as for GSC 101718 but about 80-85 m above the base of member A of the Baillarge Formation (26.7-30.3 m asl in section N).

The sample yielded 31 moderately well preserved specimens (CAI 1) assignable to:
Diaphorodus akpatokensis (Barnes) (10 specimens)
D. delicatus (Branson & Mehl) (8 specimens)
Drepanoistodus? gracilis (Branson & Mehl) (6 specimens)
Eucharodus parallelus (Branson & Mehl) (2 specimens)
Oepikodus sp. (1 specimen)
Oistodus cf. *O. multicorrugatus* Mound (4 specimens).

Remarks: This assemblage is representative of Fauna E; the sample is of late Canadian (Early Ordovician) age.

9. Locality: GSC loc. 101720; field sample no. N17,21 (1.8 kg dissolved); locality as for GSC 101718 but about 99-108 m above the base of the Baillarge Formation, member A (47.0-54.2 m asl).

The sample yielded 30 moderately well preserved specimens (CAI 1) assignable to:
Drepanoistodus sp. (5 specimens)
Eucharodus aff. *E. parallelus* (Branson & Mehl) (3 specimens)
Jumudontus gananda Cooper (1 specimen)
Oistodus multicorrugatus Mound (2 specimens)
O. scalenocarinatus Mound (1 specimen)
O. n.sp. (2 specimens)
Protoprioniodus aranda Cooper (7 specimens)
"Scolopodus" emarginatus Barnes & Tuke (1 specimen)
"S." gracilis Ethington & Clark (8 specimens)

Remarks: This assemblage represents Fauna E/ Fauna 1; the sample is of late Canadian to earliest Whiterockian (late Early-early Middle Ordovician) age.

10. Locality: GSC loc. 101721; field sample no. L2a (3.6 kg dissolved); Baillarge Formation, member B, 0-3.25 m above base (3.0-18.3 m asl in section L); Brodeur Peninsula, Baffin Island, west side of Admiralty Inlet; section L; latitude 73°33'00"N, longitude 85°22'00"W.

The sample yielded 43 moderately well preserved specimens (CAI 1) assignable to:
Culumbodina penna Sweet (1 specimen)
Drepanoistodus suberectus (Branson & Mehl) (5 specimens)
?Oulodus ulrichi (Stone & Furnish) (3 specimens)
Panderodus breviusculus Barnes (1 specimen)
P. gracilis (Branson & Mehl) (21 specimens)
P. n.sp. (2 specimens)
Plectodina sp. (4 specimens)
Pseudobelodina? dispansa (Glenister) (2 specimens)
P. kirki (Stone and Furnish) (3 specimens)
 belodiniiform element indet. (1 specimen)

Remarks: The sample is of Edenian-mid Maysvillian (Late Ordovician) age. *P. breviusculus* is not known to range above the mid Maysvillian. Other taxa present range into Richmondian strata, some even into Gamachian strata.

11. Locality: GSC loc. 101722; field sample no. L5e,f,g,L7 (1.8 kg dissolved); locality as for GSC 101721 but about 57.0-74.5 m above base of member B, Baillarge Formation (60.0-77.5 m asl in section L).

The sample yielded 32 well preserved specimens (CAI 1) assignable to:
Belodina sp. (1 specimen)
Panderodus gibber Nowlan & Barnes (1 specimen)

P. gracilis (Branson & Mehl) (29 specimens)

Pseudooneotodus beckmanni (Bischoff & Sannemann) (1 specimen)

Remarks: This fauna is not biostratigraphically diagnostic in the context of this report; the sample could be of Middle to Late Ordovician age, but based on the sample below (GSC 101721), it must be of Late Ordovician age. Three specimens of *Panderodus gracilis* are in a fused cluster.

12. Locality: GSC loc. 101723; field sample no. L7a (3.7 kg dissolved); locality as for GSC 101721 but about 74.1-96.0 m above base of member B of the Baillarge Formation. (76.1-99.0 m asl in section L).

The sample yielded 44 well preserved specimens (CAI 1) assignable to:

Amorphognathus sp. (1 specimen)

Belodina confluens Sweet (4 specimens)

Drepanoistodus sp. (3 specimens)

Panderodus gibber Nowlan & Barnes (1 specimen)

P. gracilis (Branson & Mehl) (31 specimens)

P. panderi (Stauffer) (3 specimens)

Walliserodus sp. (1 specimen)

Remarks: This assemblage indicates a Late Ordovician age; a more precise biostratigraphic assignment is not possible.

13. Locality: GSC loc. 101724; field sample no. L7o (3.6 kg dissolved); locality as for GSC 101721 but 185.0-189.0 m above base of member B, Baillarge Formation (188.0-192.0 m asl in section L)

The sample yielded only 9 moderately well preserved specimens (CAI 1) assignable to:

Oulodus rohneri Ethington & Furnish (1 specimen)

Panderodus gracilis (Branson & Mehl) (7 specimens)

P. liratus Nowlan & Barnes (1 specimen)

Remarks: This assemblage indicates a Richmondian-Gamachian (Late Ordovician) age for the sample.

14. Locality: GSC loc. 101725; field sample no. L10b (3.9 kg dissolved); locality as for GSC 101721, but 220.0-224.3 m above base of member B, Baillarge Formation (223.0-227.3 m asl in section L).

The sample yielded only nine poorly preserved specimens (CAI 1) assignable to:

Oulodus? sp. (3 specimens)

Ozarkodina? sp. (3 specimens)

Panderodus gracilis (Branson & Mehl) (3 specimens)

Remarks: The sample is possibly of Silurian age based on the morphology of ramiform elements assigned questionably to *Ozarkodina*. Otherwise the assemblage is undiagnostic and might be of Late Ordovician or Silurian age.

15. Locality: GSC loc. 101726; field sample no. SP1 (7.0 kg dissolved); locality is north shore of Port Bowen (73°13'28"N, 89°17'50"W). The sample was obtained from the uppermost few metres of the lower member of the Cape Crauford Formation (about 150 m asl); however, it may have been mislabelled because the age seems much too old for the Cape Crauford Formation.

The sample yielded 17 fragmentary specimens (CAI 1) assignable to:

? *Diaphorodus akpatokensis* (Barnes) (7 specimens)
Eucharodus sp. (1 specimen)
Panderodus sp. (6 specimens)
"*Scolopodus*" *emarginatus* Barnes & Tuke (2 specimens)
drepanodontiform element indet. (1 specimen)

Remarks: This assemblage is of mid Canadian (Fauna D) to Whiterockian (Early to early Middle Ordovician age).

Conclusions

The fact that so many of these samples are channel samples of considerable vertical extent detracts from the precision of several of the biostratigraphic conclusions.

Samples from the upper part of the Ship Point Formation (sections M, MX) yield conodonts assignable to Fauna C and Fauna D. The transition between these two faunas presumably occurs within the upper part of the Ship Point Formation.

Samples from member A of the Baillarge Formation yield conodonts assignable to Faunas D, E and Fauna 1, indicating a mid Canadian to early Whiterockian age. The Lower-Middle Ordovician boundary is within the upper part of the member.

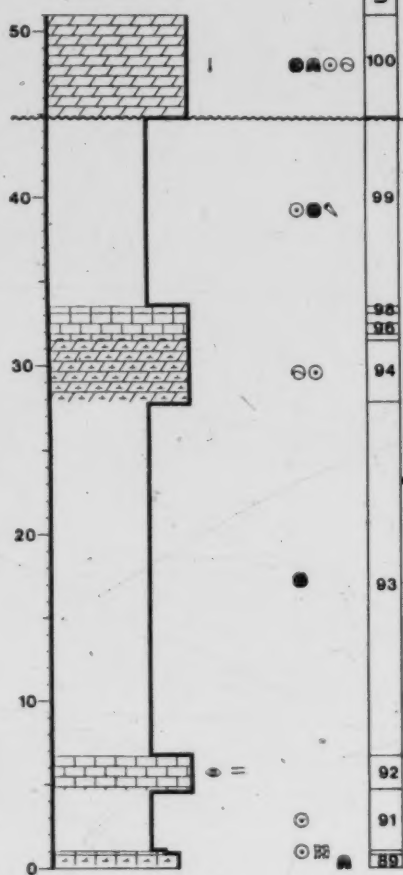
Samples from member B of the Baillarge Formation yield Upper Ordovician conodonts. The lowest sample (GSC 101721) is of Edenian-mid Maysvillian age; higher samples are of Richmondian-Gamachian age (GSC 101724). The highest sample (GSC 101725) yields conodonts that may be of Silurian age. It is likely that the Ordovician-Silurian boundary is within this member.

It seems likely that there is a Middle Ordovician hiatus, because only about 25 m of strata separates lowest Middle Ordovician beds from lower Upper Ordovician beds.

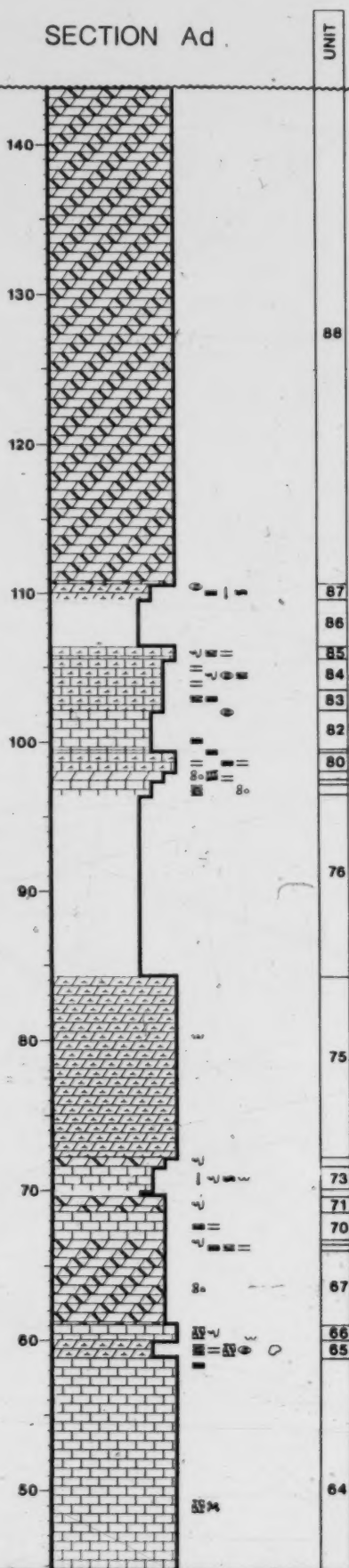
The conodonts recovered are thermally unaltered, indicating that heat flow in the area has never exceeded 90°C.

Note: the report was prepared by Godfrey S. Nowlan, Ottawa Paleontology Section, Geological Survey of Canada, Ottawa, Ontario, dated 5 June, 1986.

SECTION Ae



SECTION Ad



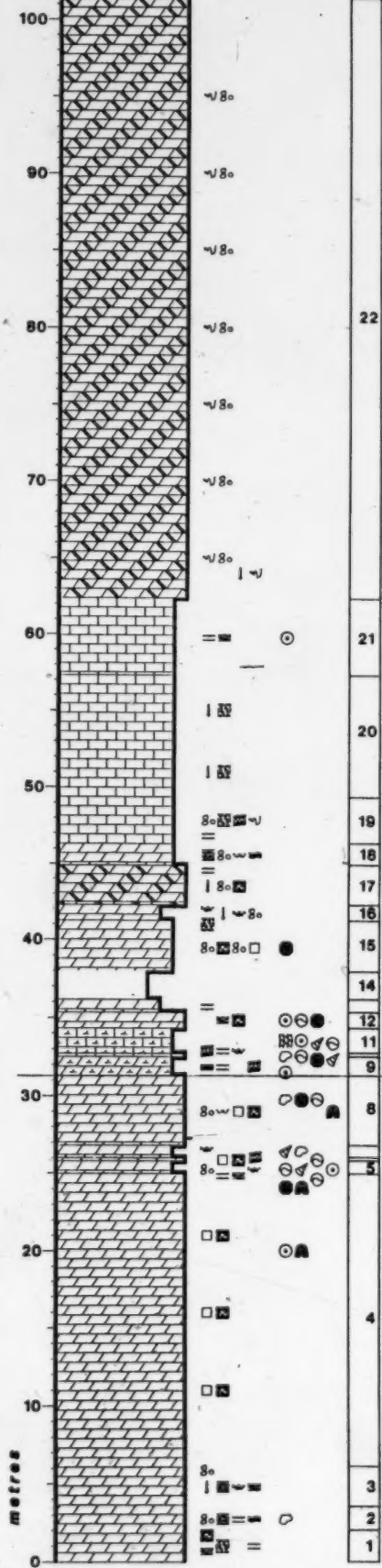
Cape Crauford Formation,
upper member

Cape Crauford Formation,
lower member

SECTION Ac

UNIT

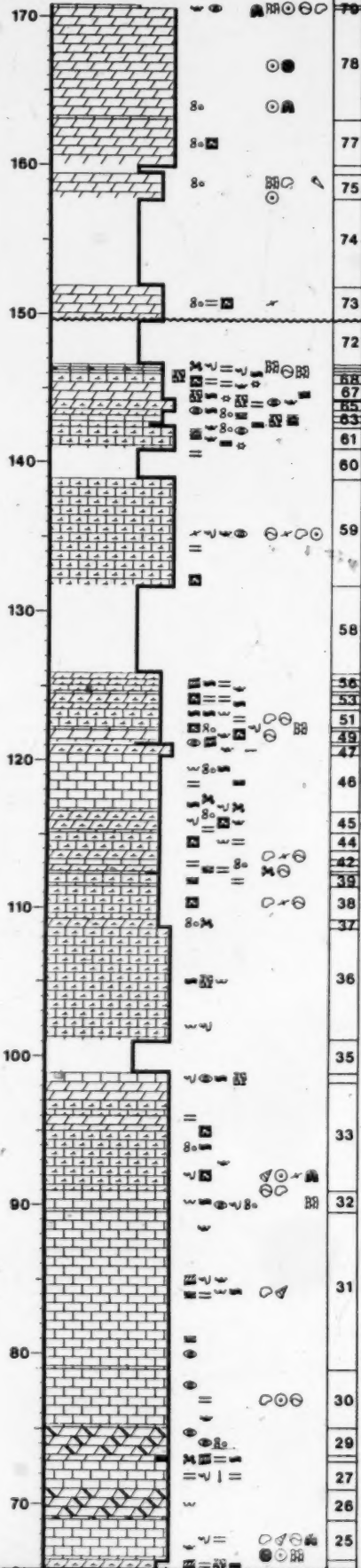
SECTION B



Cape Crauford Formation,
lower member

Baillarge Formation, member b

SECTION C

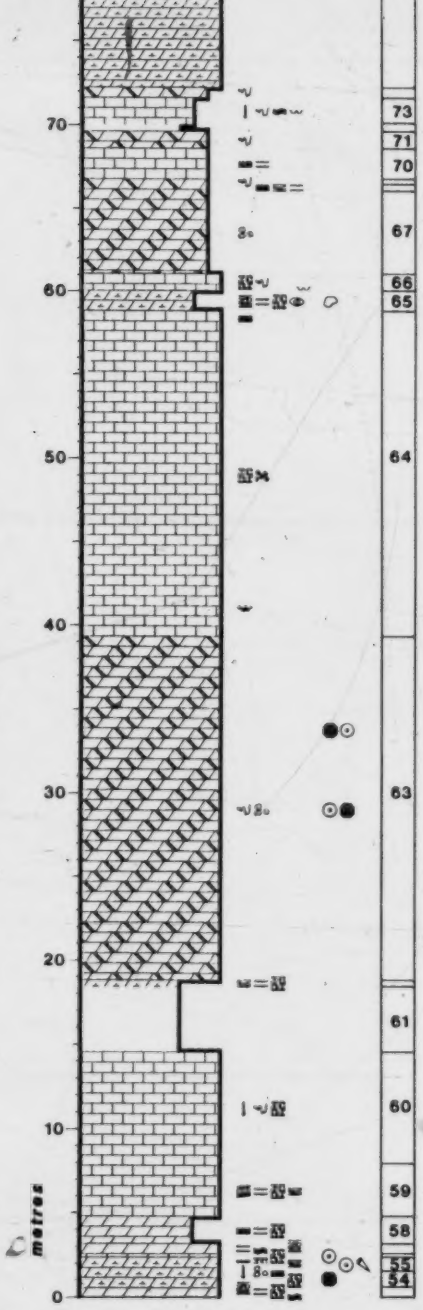
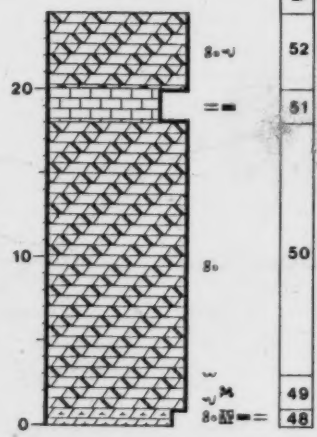
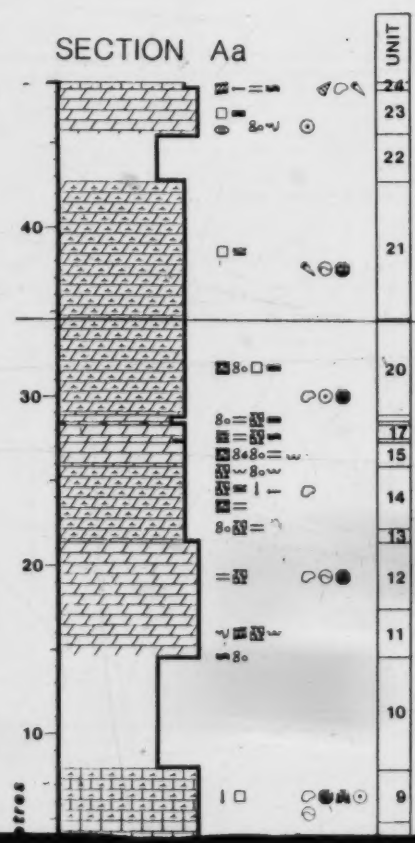


Cape Crauford Formation,
upper member

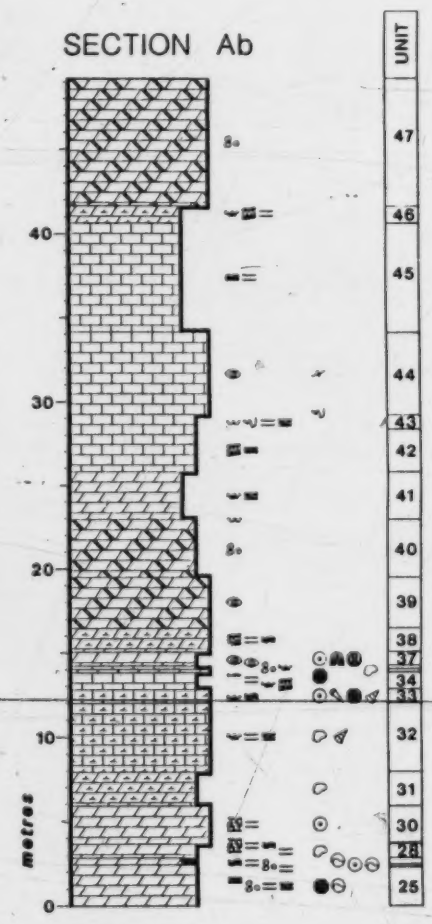
Cape Crauford Formation,
lower member

Cape Crauford Formation,
lower member

SECTION Aa

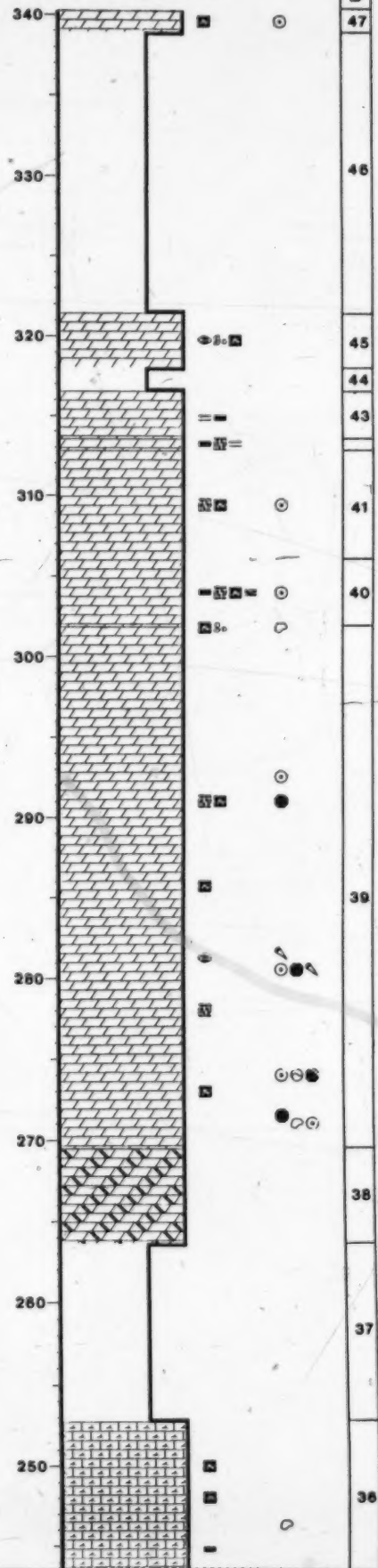


SECTION Ab

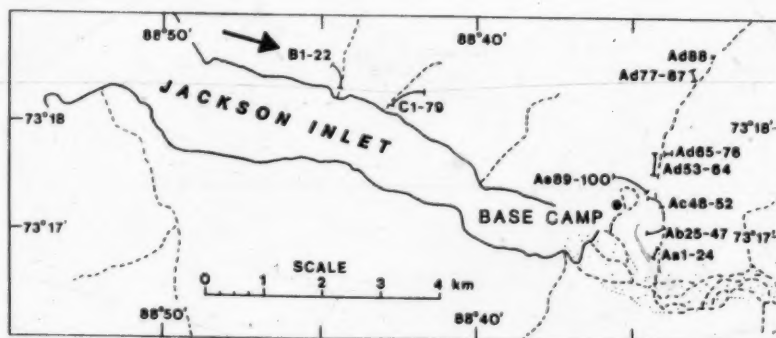
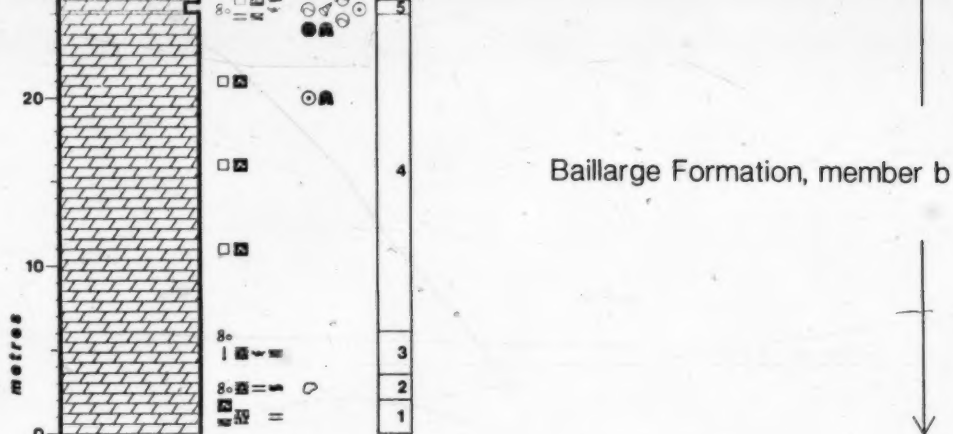


Baillarge Formation, member b

SECTION G

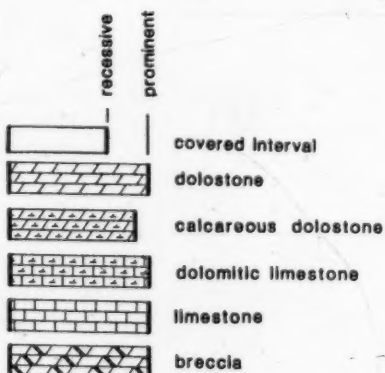


Cape Crauford
Formation,
upper member

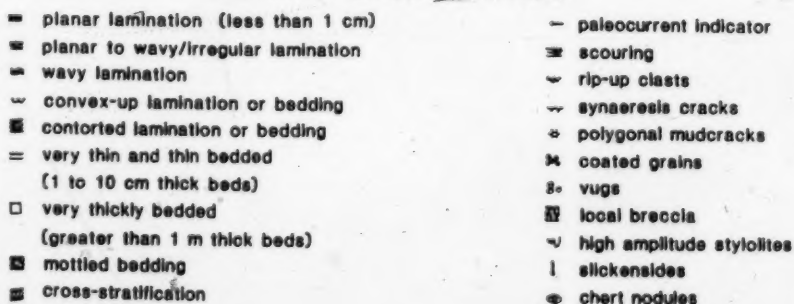


LEGEND

LITHOLOGY SYMBOLS



SEDIMENTARY STRUCTURE SYMBOLS



FOSSIL SYMBOLS

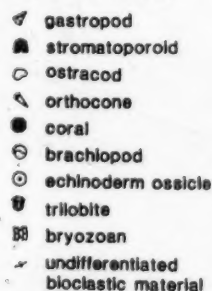
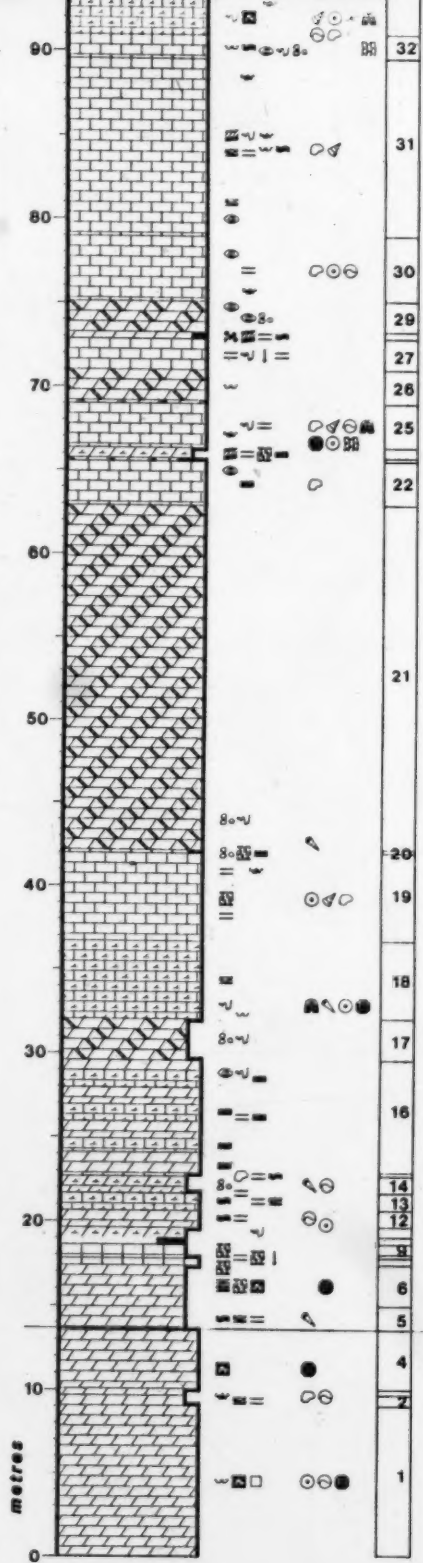


Figure B: Section B, Jackson Inlet

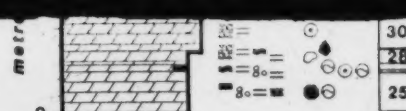
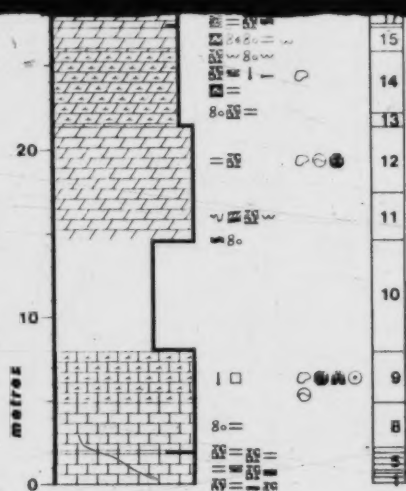


Cape Crauford Formation,
lower member

Baillarge Formation, member b



LEGEND

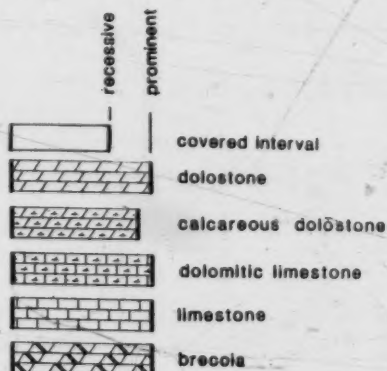


Baillarge Formation, member b

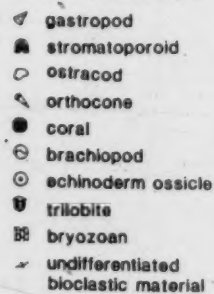


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LITHOLOGY SYMBOLS



FOSSIL SYMBOLS



SEDIMENTARY STRUCTURE SYMBOLS

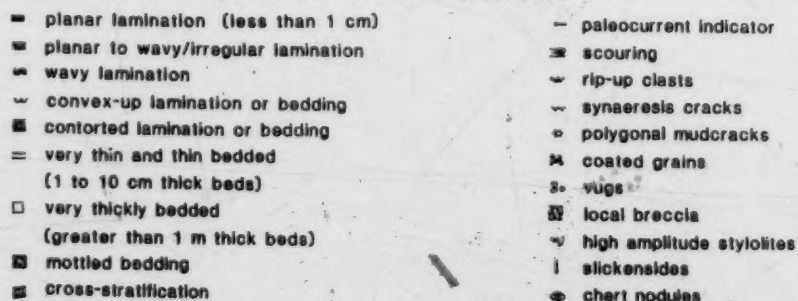
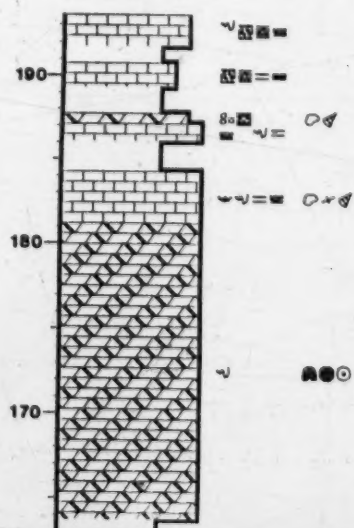


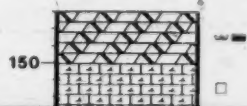
Figure A: Section A, Jackson Inlet

SECTION E



UNIT
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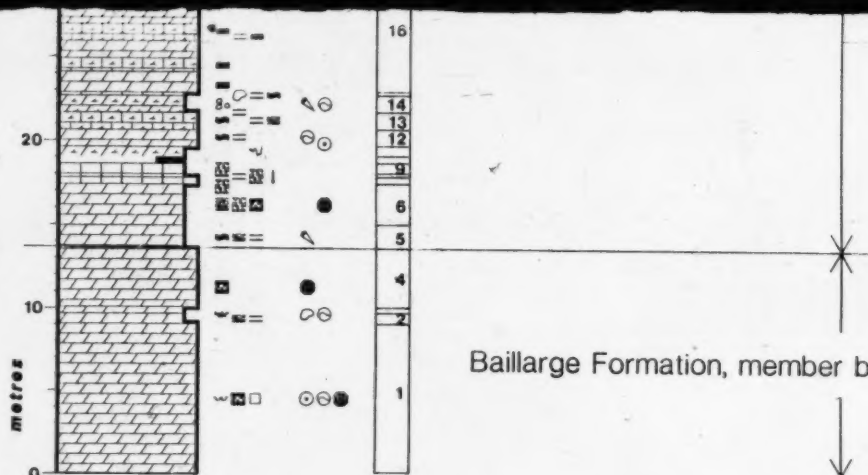
SECTION F



UNIT
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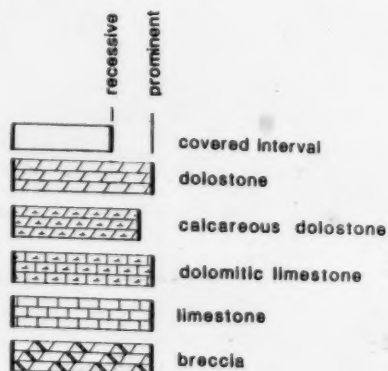
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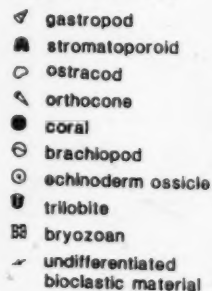


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LITHOLOGY SYMBOLS



FOSSIL SYMBOLS



SEDIMENTARY STRUCTURE SYMBOLS

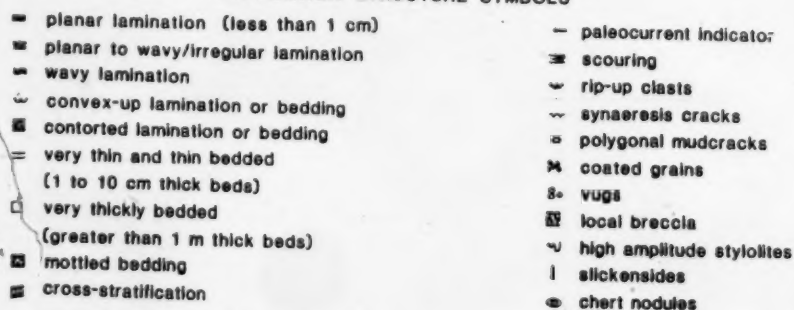
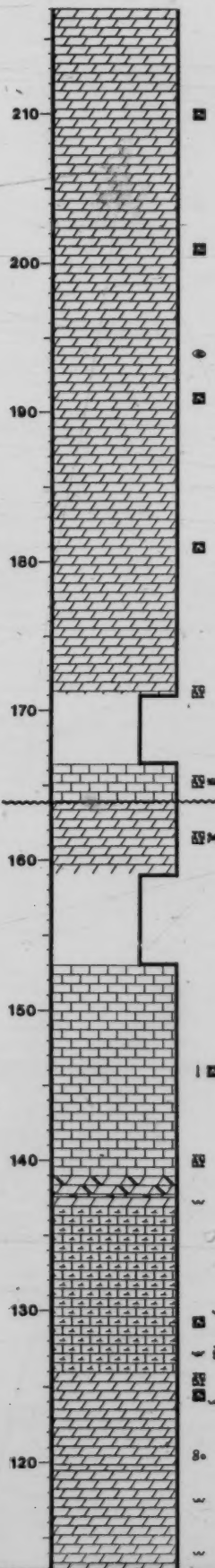


Figure C: Section C, Jackson Inlet

SECTION DX



UNIT

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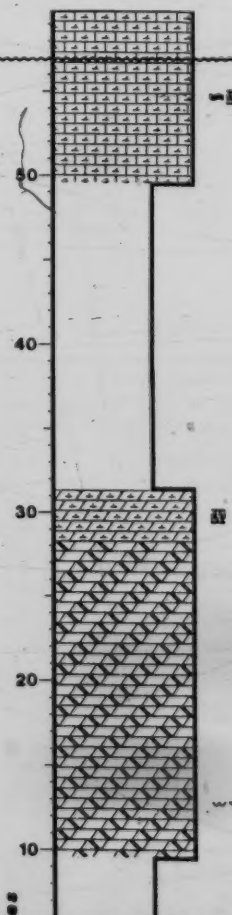
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SECTION TL



UNIT

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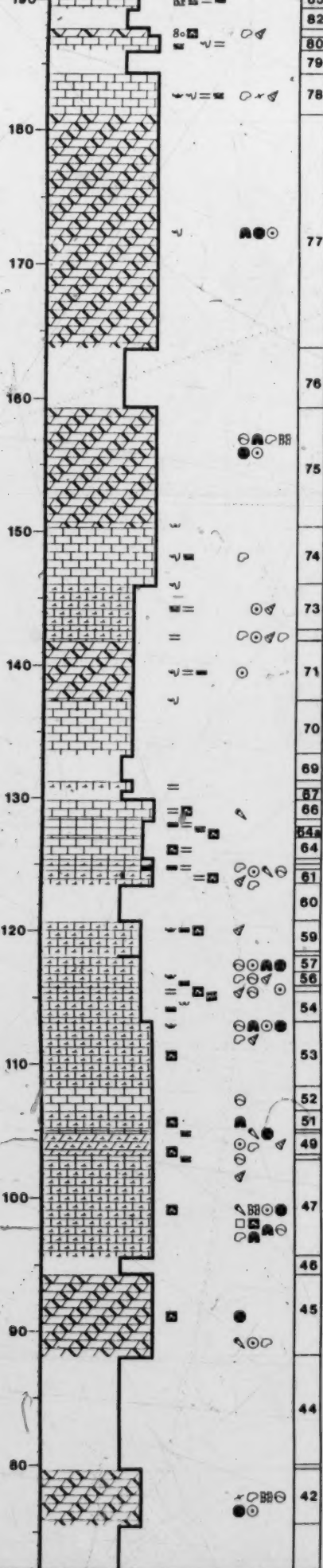
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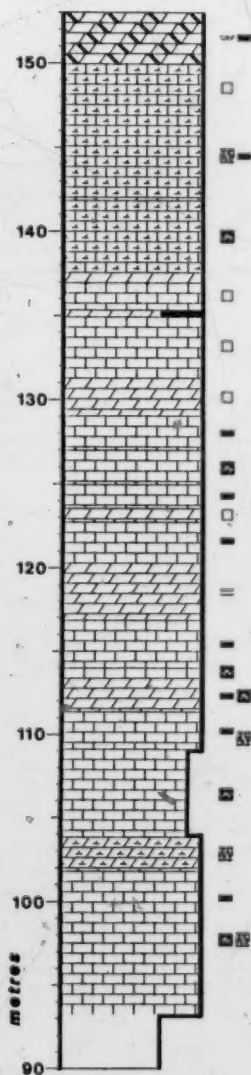
2

Cape Crauford Formation,
upper member

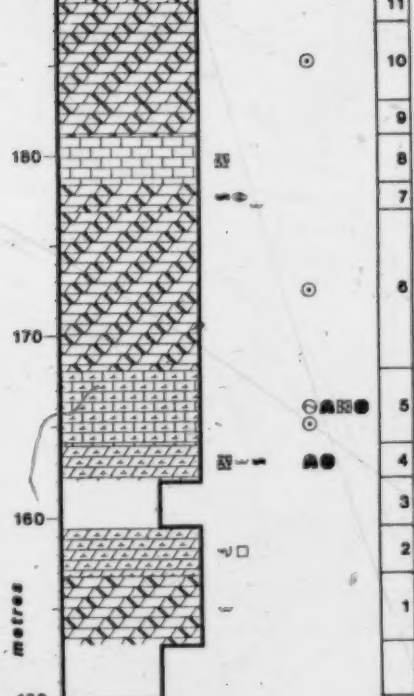


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SECTION F

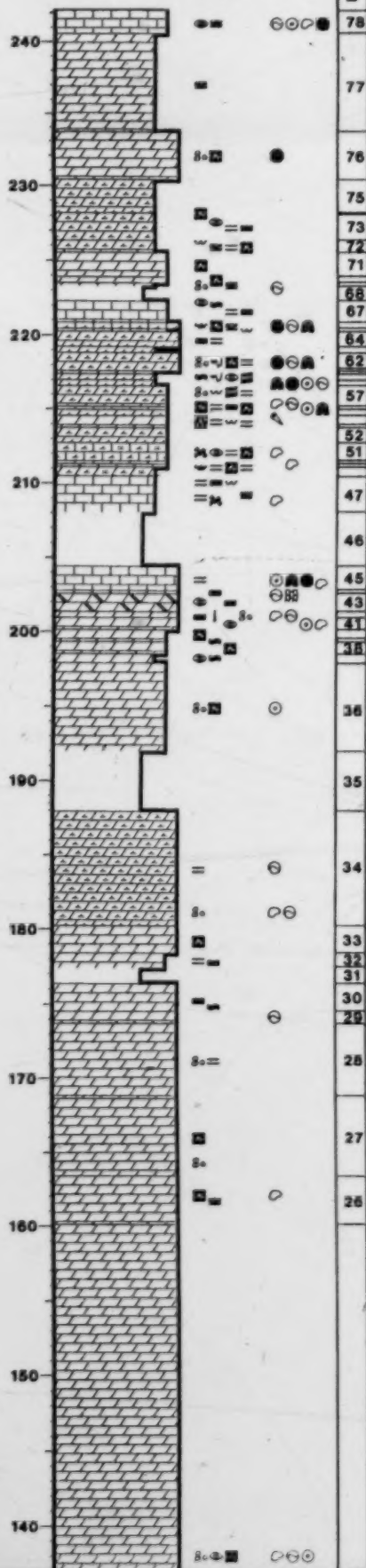


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Cape Crauford Formation,
lower member

SECTION H

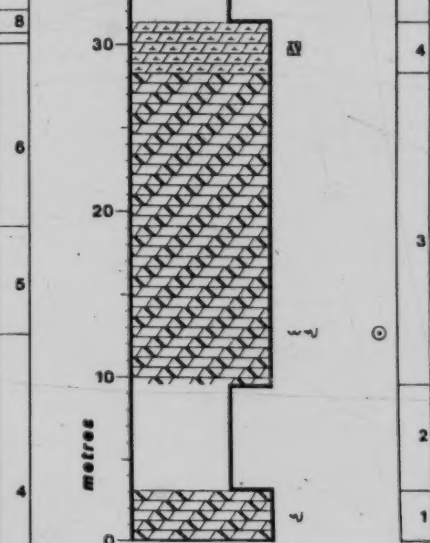
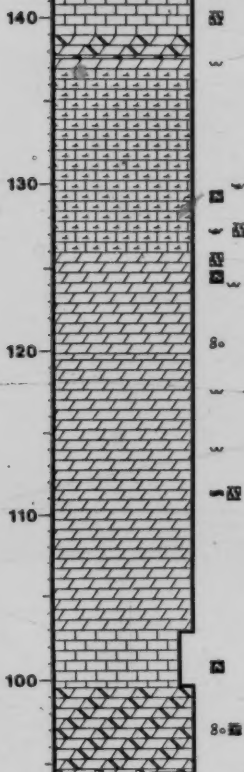
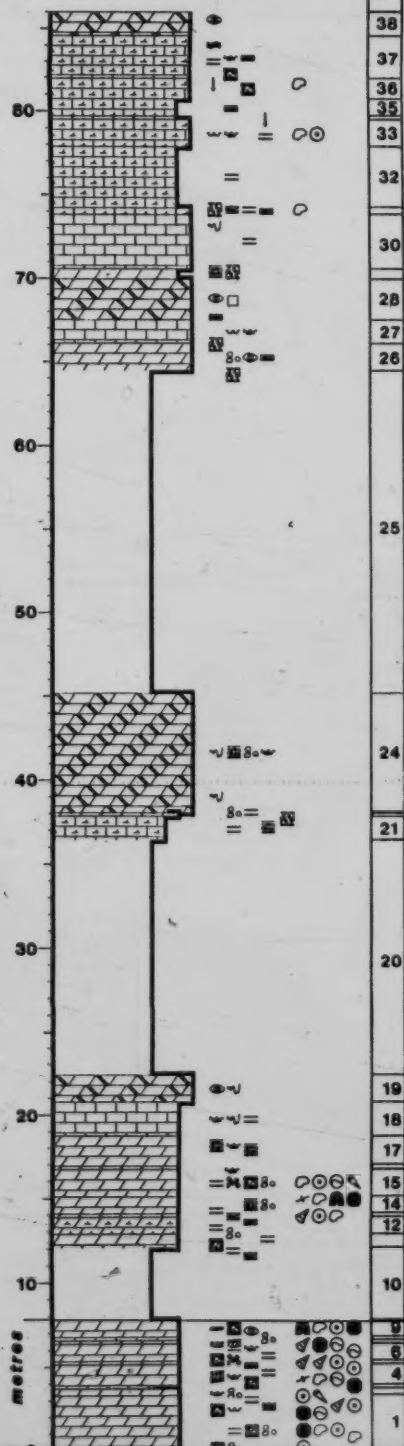


unit b

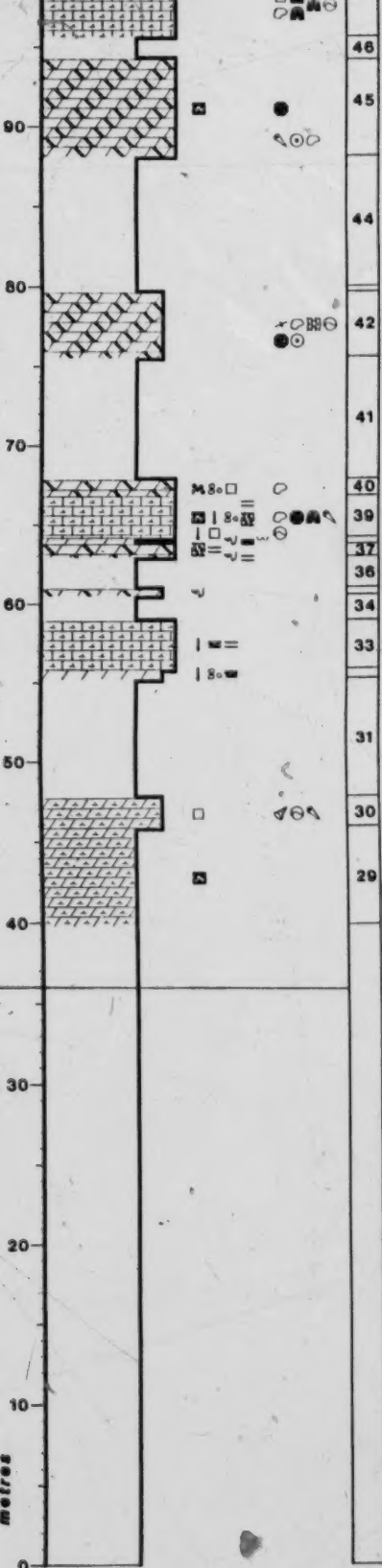
Cape Crauford Formation,
upper member

unit a

SECTION D

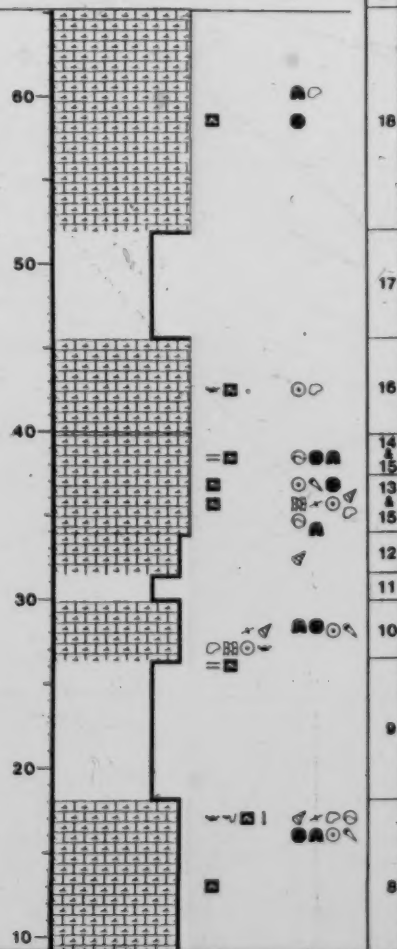


Cape Crauford Formation,
lower member



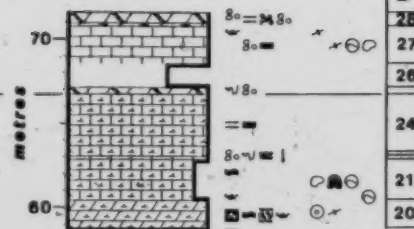
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SECTION E



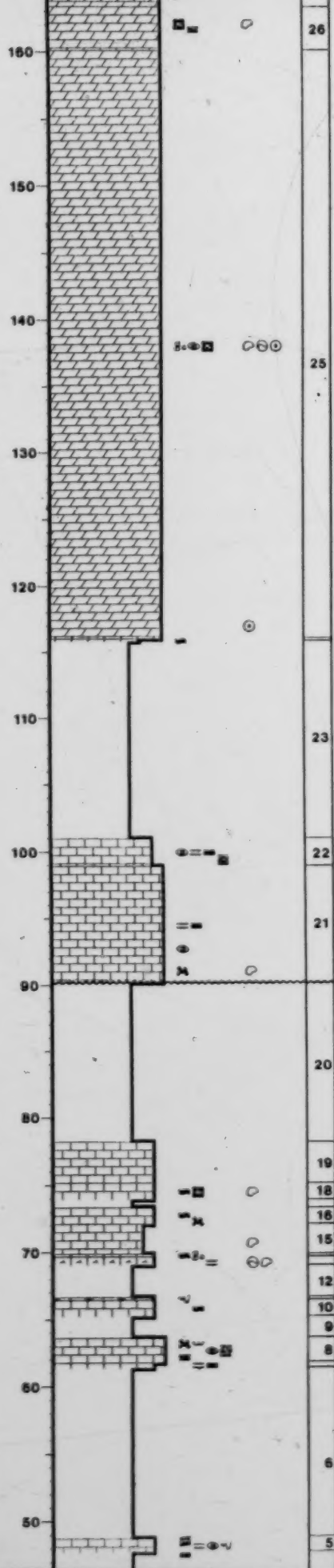
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SECTION E

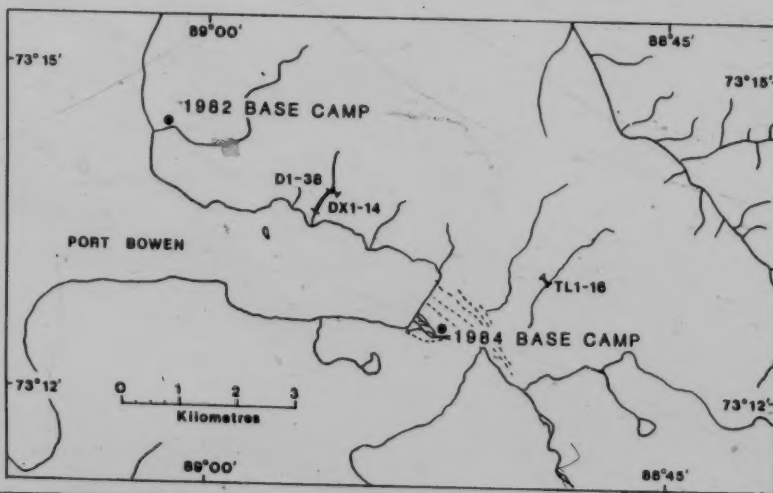
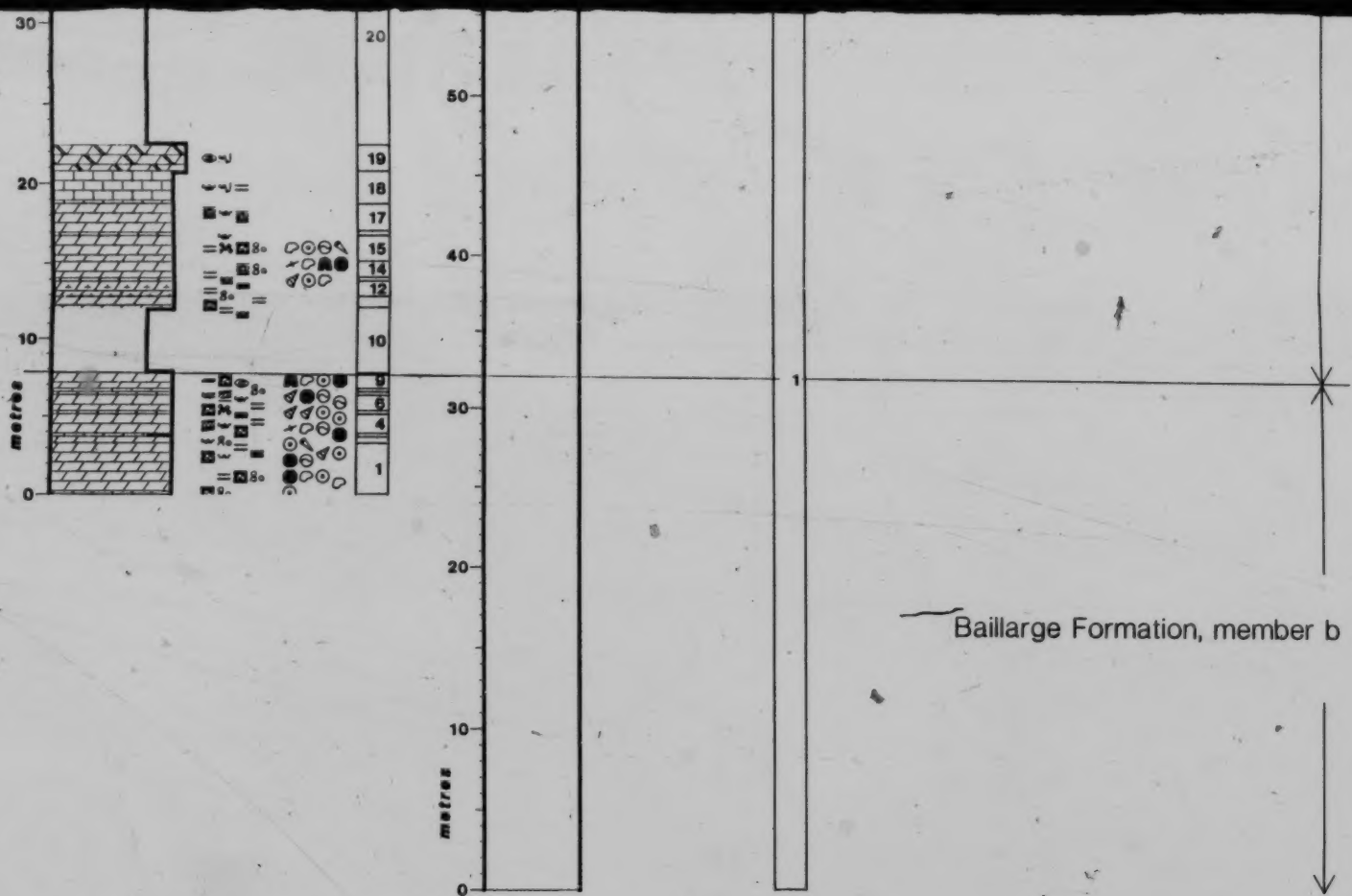


UNIT
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Baillarge Formation, member b

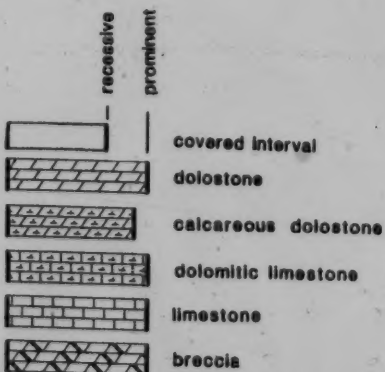


Cape Crawford Formation

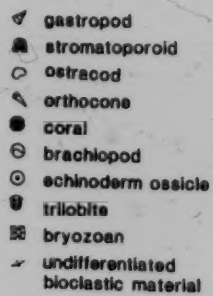


LEGEND

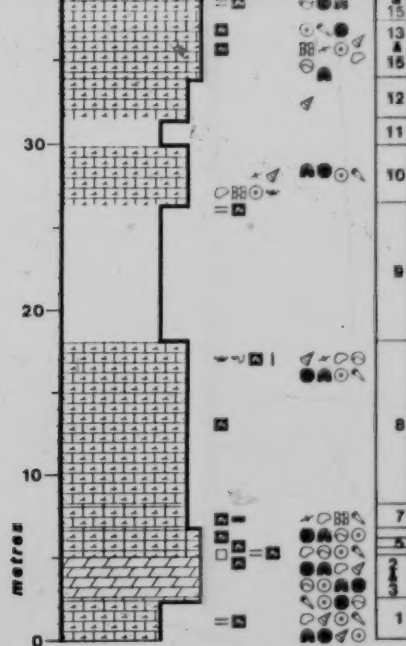
LITHOLOGY SYMBOLS



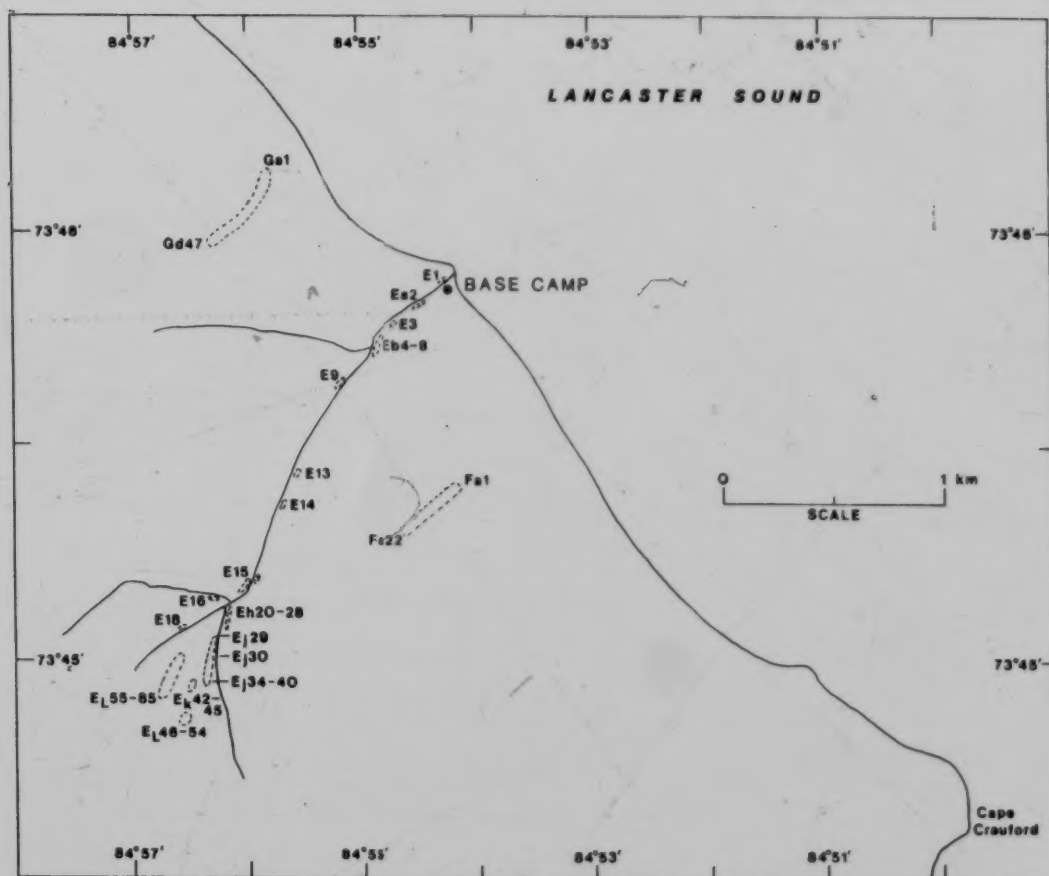
FOSSIL SYMBOLS



SEDIMENTARY STRUCTURE SYMBOLS

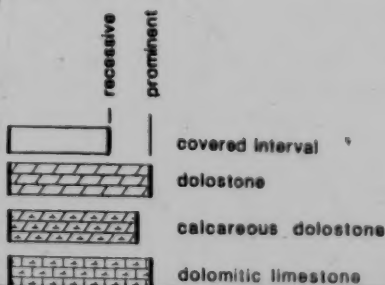


Baillarge Formation, member b

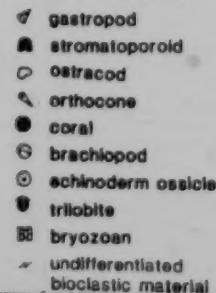


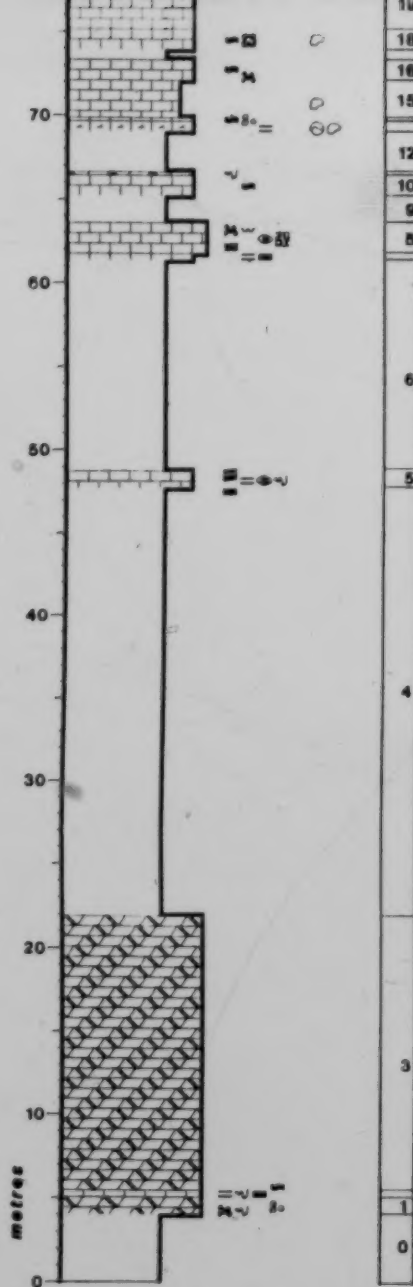
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LITHOLOGY SYMBOLS

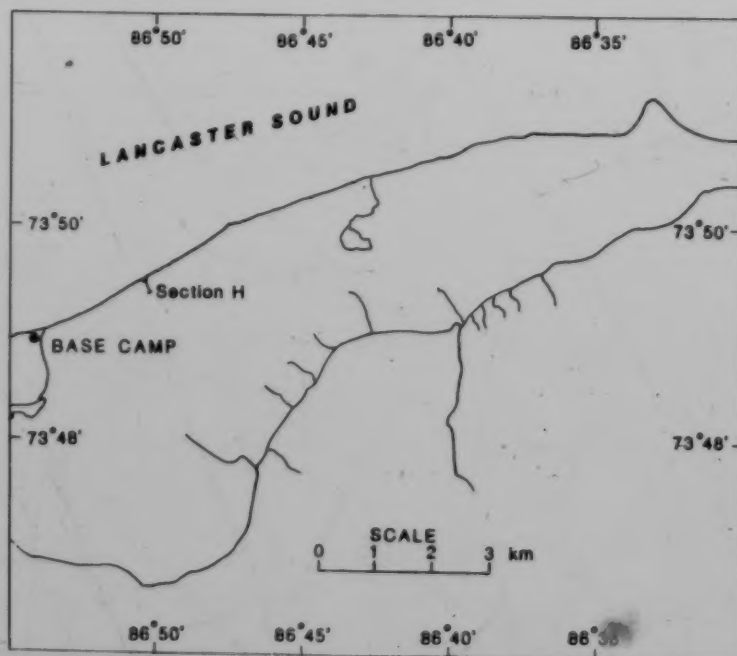


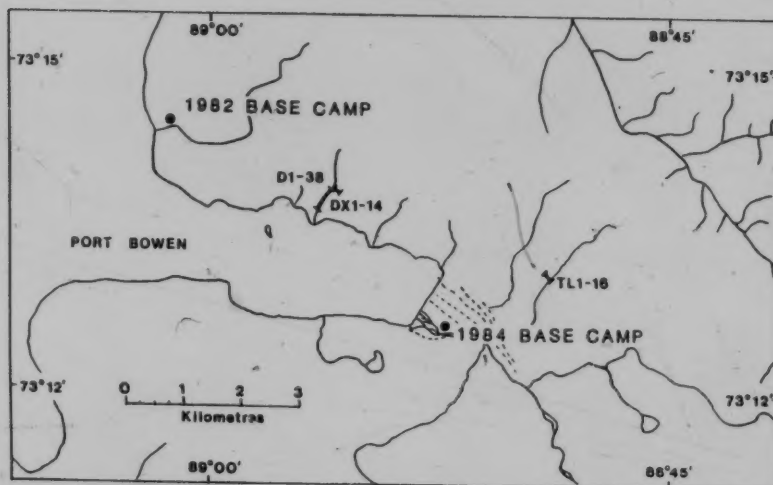
FOSSIL SYMBOLS





Cape Crauford Formation,
lower member





LEGEND

LITHOLOGY SYMBOLS

recessive	prominent
	covered interval
	dolostone
	calcareous dolostone
	dolomitic limestone
	limestone
	breccia

FOSSIL SYMBOLS

	gastropod
	stromatoporoid
	ostracod
	orthocone
	coral
	brachiopod
	echinoderm ossicle
	trilobite
	bryozoan
	undifferentiated bioclastic material

SEDIMENTARY STRUCTURE SYMBOLS

	planar lamination (less than 1 cm)
	planar to wavy/irregular lamination
	wavy lamination
	convex-up lamination or bedding
	contorted lamination or bedding
	very thin and thin bedded (1 to 10 cm thick beds)
	very thickly bedded (greater than 1 m thick beds)
	mottled bedding
	cross-stratification
	paleocurrent indicator
	scouring
	rip-up clasts
	synaeresis cracks
	polygonal mudcracks
	coated grains
	vugs
	local breccia
	high amplitude stylolites
	slickensides
	chert nodules

Figure D: Sections D,DX and TL, Port Bowen

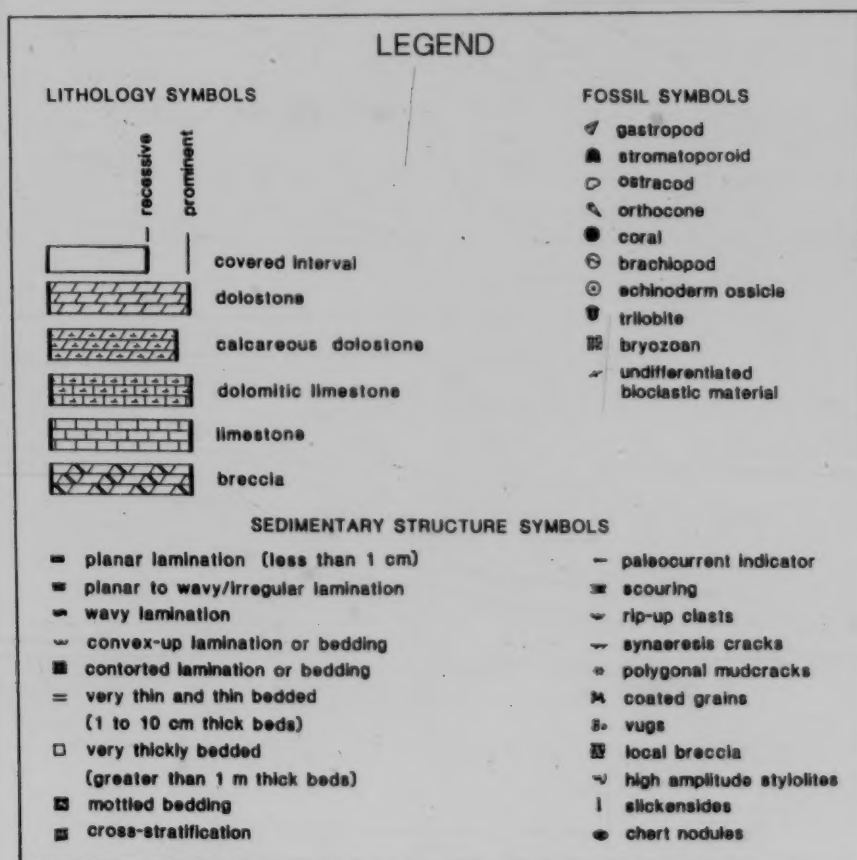
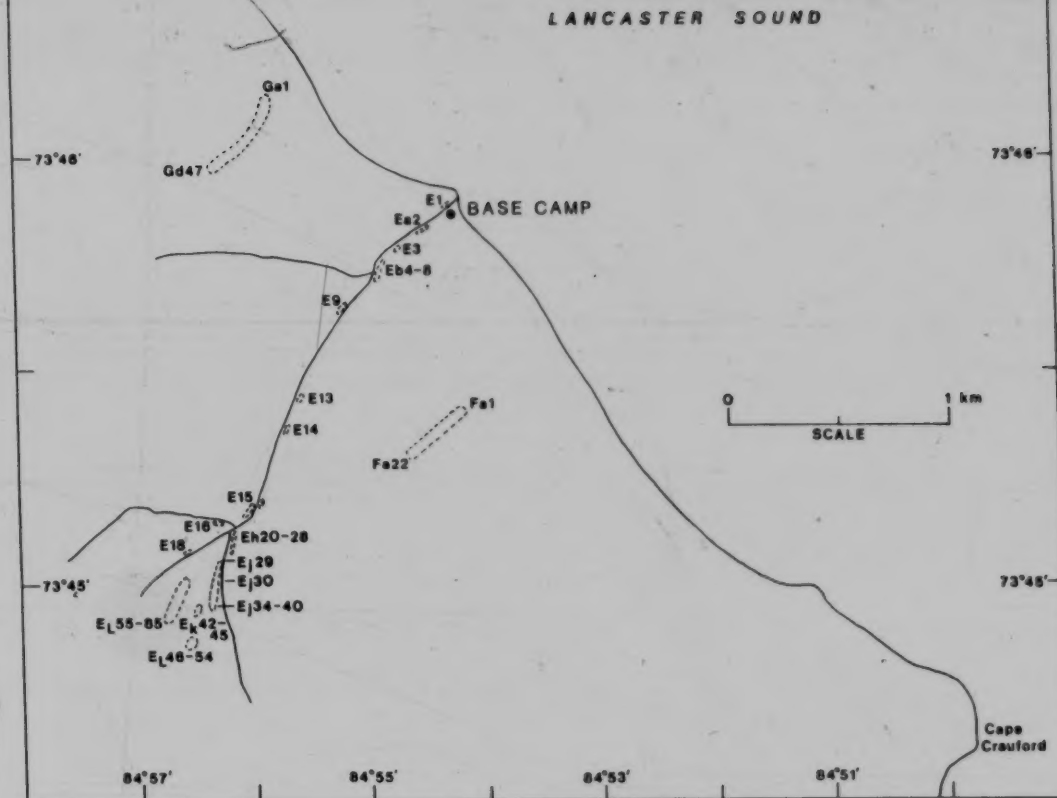


Figure E: Sections E, F & G, Cape Crauford

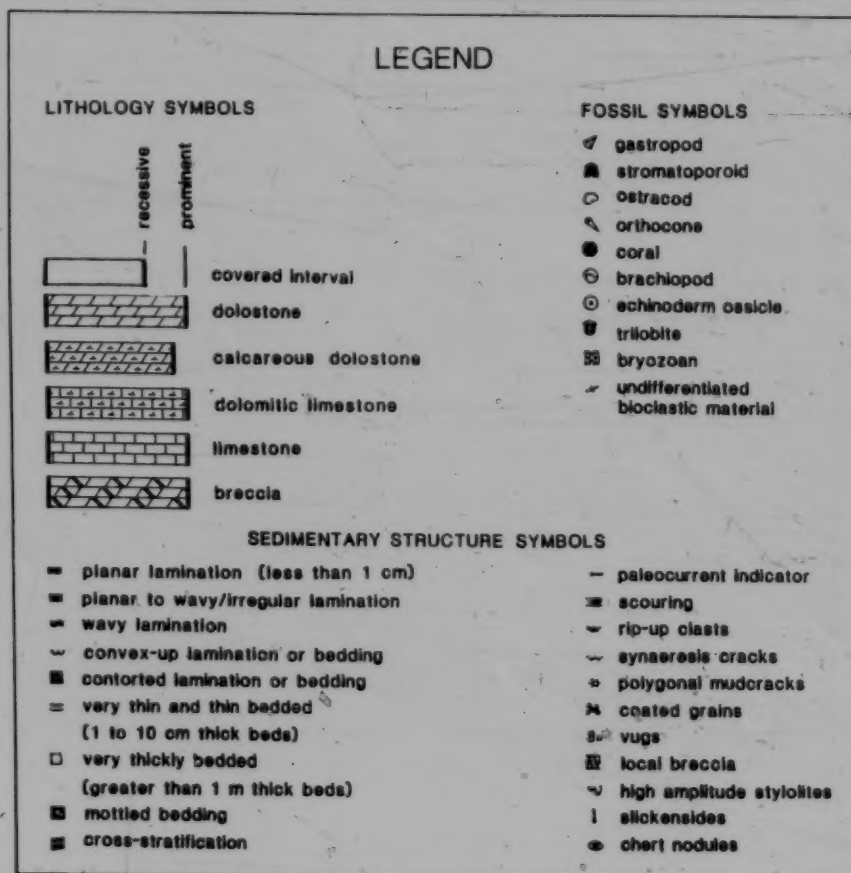
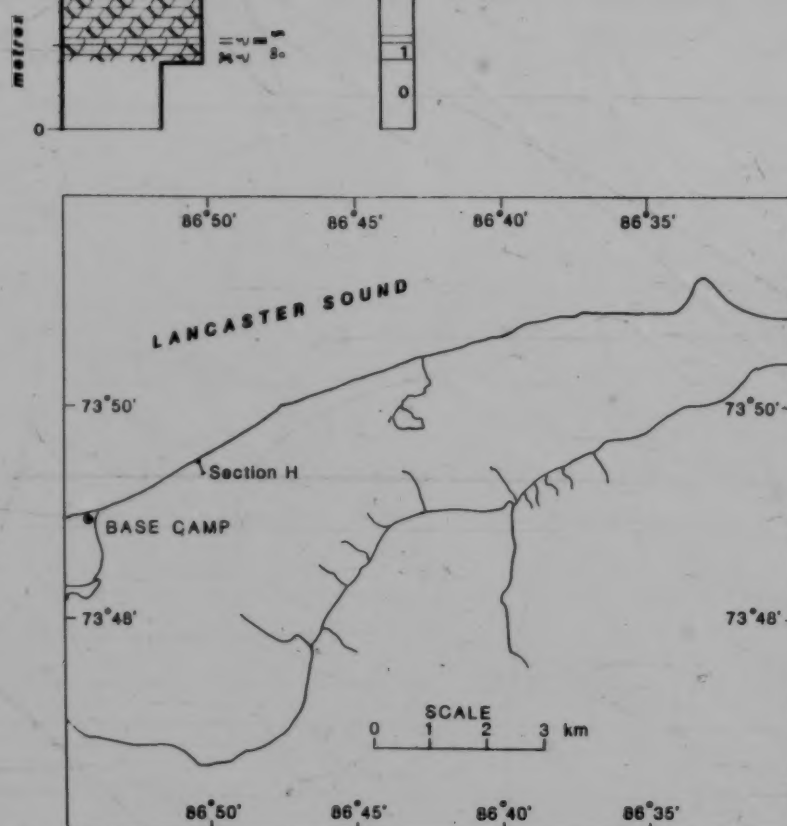
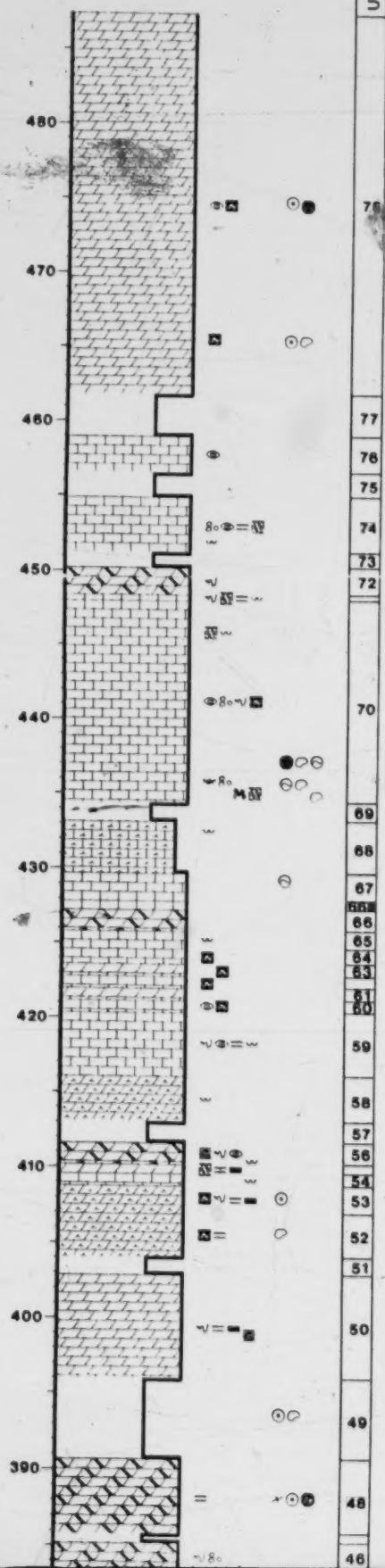


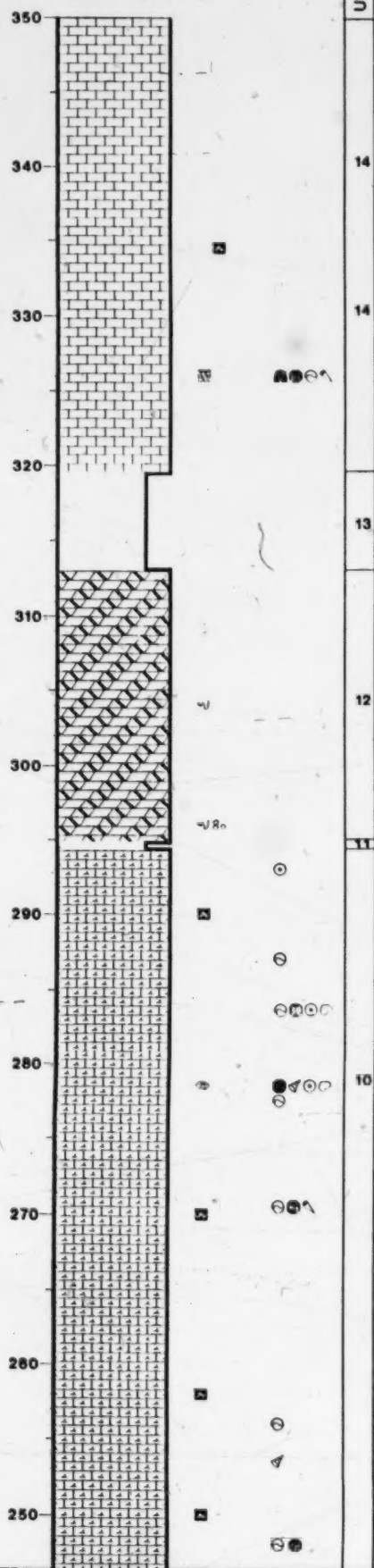
Figure F: Section H, Cape York

SECTION J



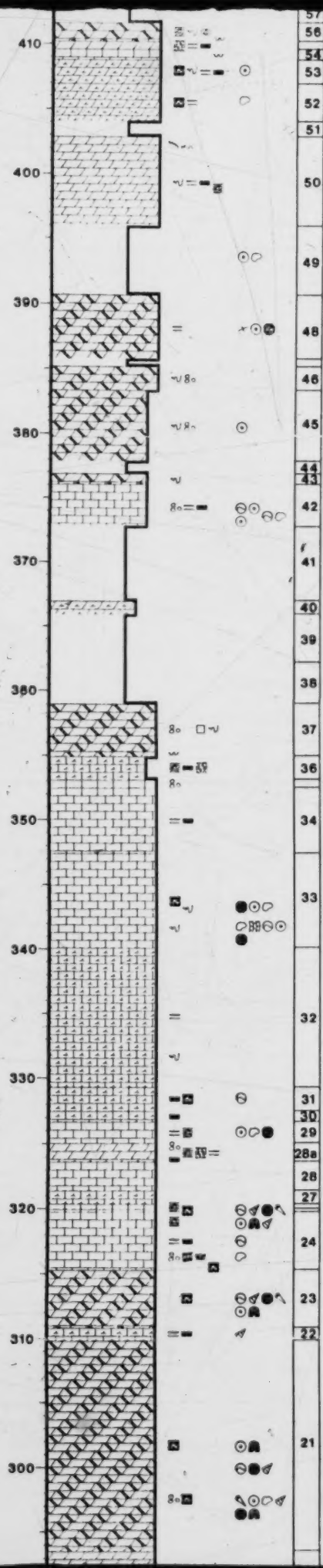
Cape Crauford Formation,
upper member

SECTION L



SECTION O





Cape Crauford Formation,
lower member

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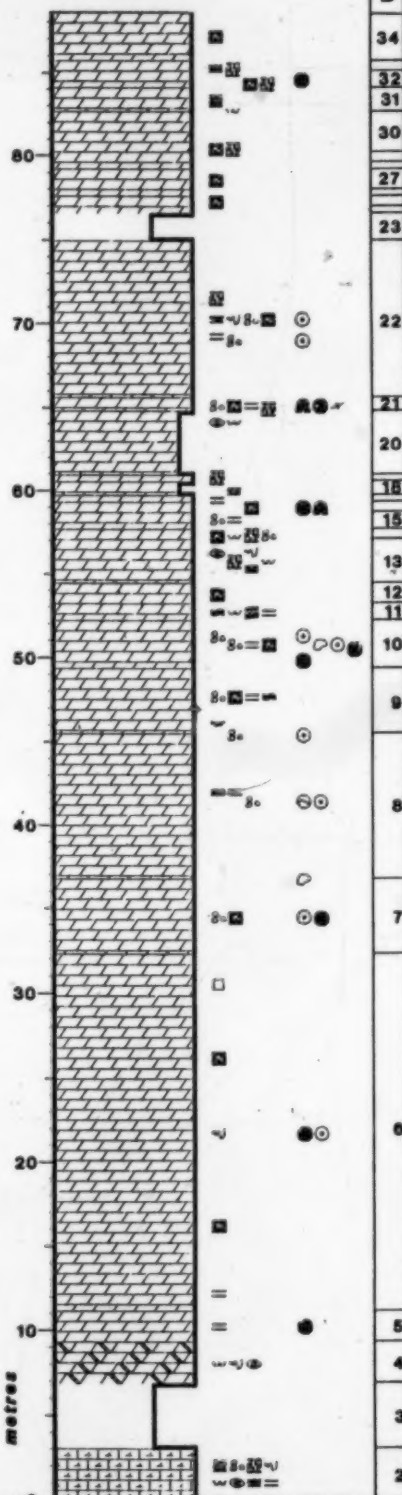
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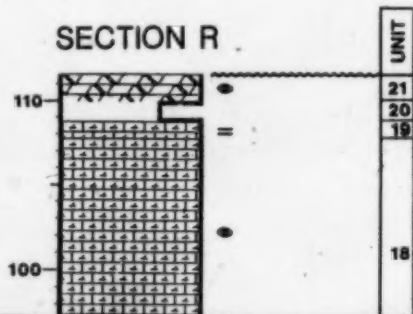
Baillarge Formation, member b

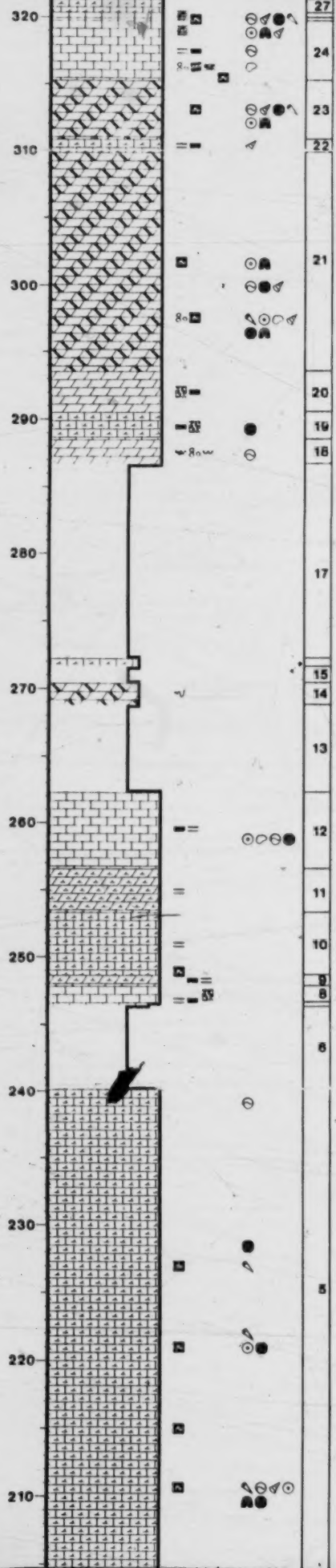
SECTION Q



Cape Crauford Formation,
upper member

SECTION R





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7

7

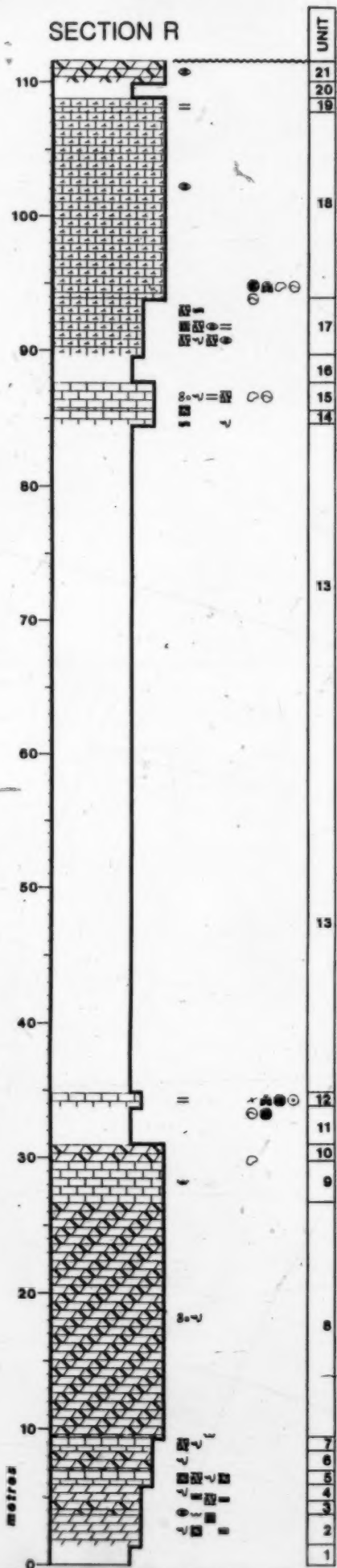
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7

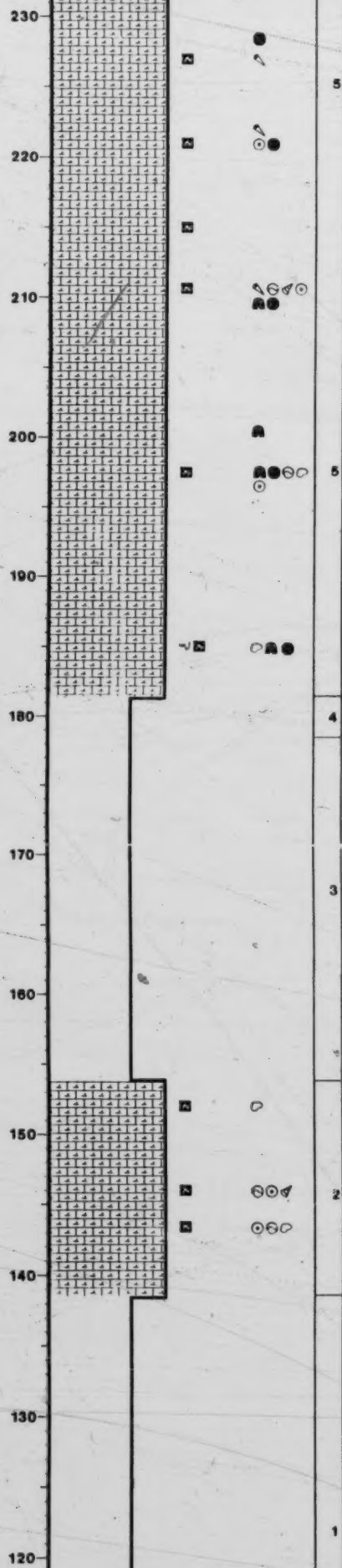
6

Baillarge Formation, member b

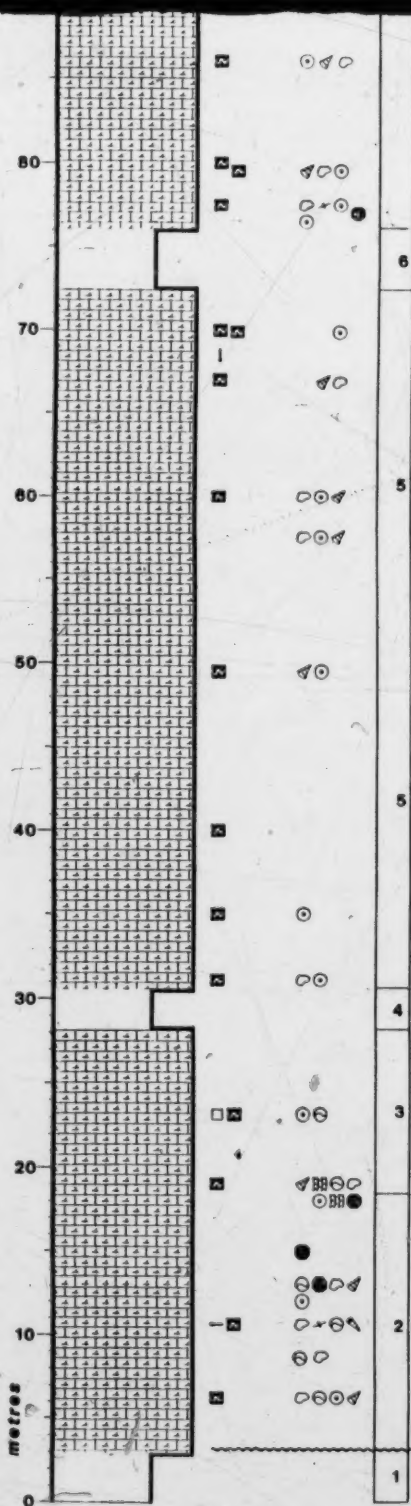
SECTION R



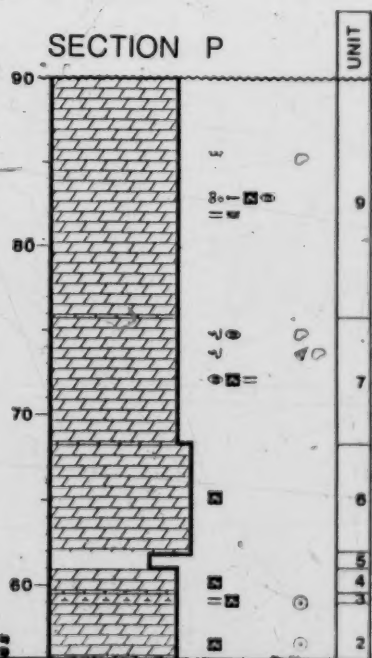
Cape Crauford Formation,
lower member

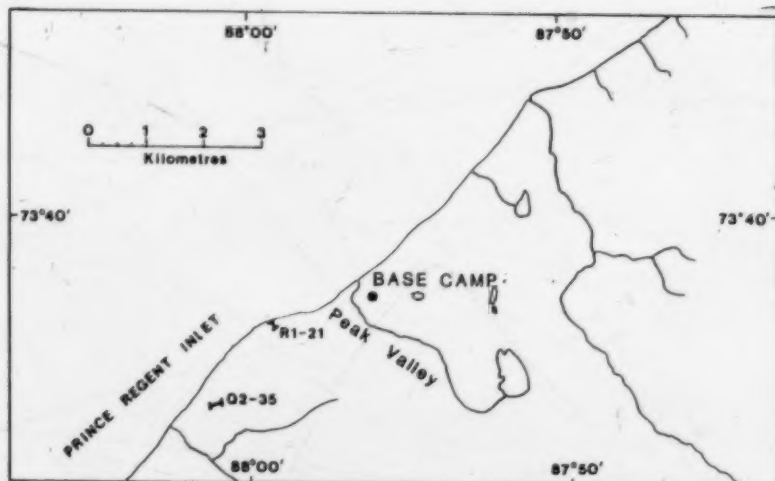
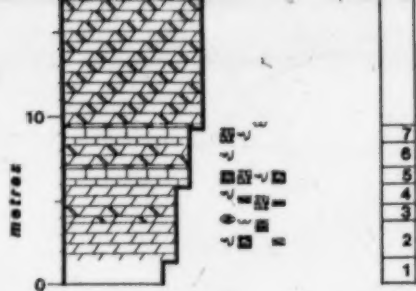


Baillarge Formation, member b



SECTION P





LEGEND

LITHOLOGY SYMBOLS

recessive	prominent
	covered interval
	dolostone
	calcareous dolostone
	dolomitic limestone
	limestone
	breccia

FOSSIL SYMBOLS

	gastropod
	stromatoporoid
	ostracod
	orthocone
	coral
	brachiopod
	echinoderm ossicle
	trilobite
	bryozoan
	undifferentiated bioclastic material

SEDIMENTARY STRUCTURE SYMBOLS

	planar lamination (less than 1 cm)
	planar to wavy/irregular lamination
	wavy lamination
	convex-up lamination or bedding
	contorted lamination or bedding
	very thin and thin bedded (1 to 10 cm thick beds)
	very thickly bedded (greater than 1 m thick beds)
	mottled bedding
	cross-stratification
	paleocurrent indicator
	scouring
	rip-up clasts
	synaeresis cracks
	polygonal mudcracks
	coated grains
	vugs
	local breccia
	high amplitude stylolites
	slickensides
	chert nodules

Figure 1: Sections Q & R, Peak Valley

140

130

120

110

100

90

80

70

Baillarge Formation, member b

SECTION K

110

100

90

80

70

60

UNIT

5

5

4

3

2

SECTION I

50

40

30

UNIT

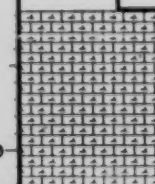
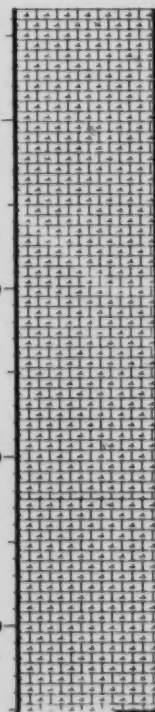
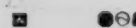
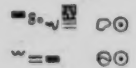
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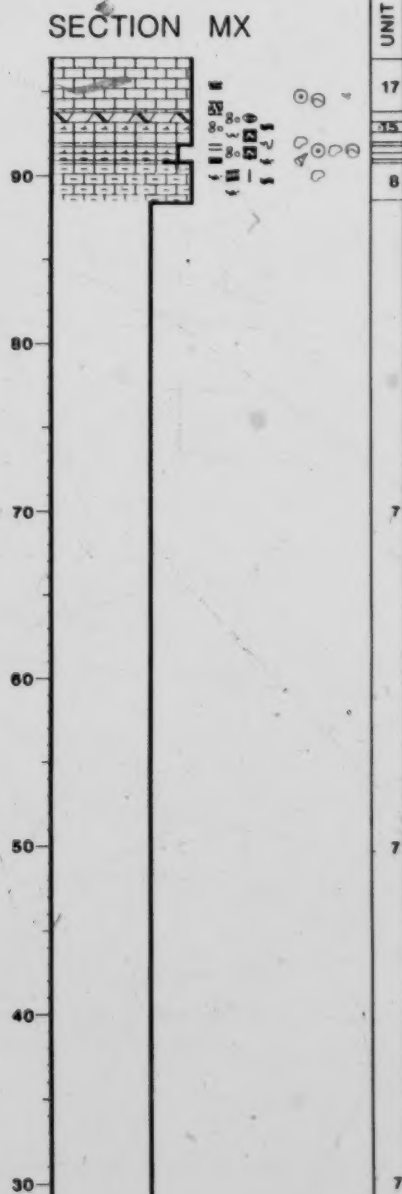
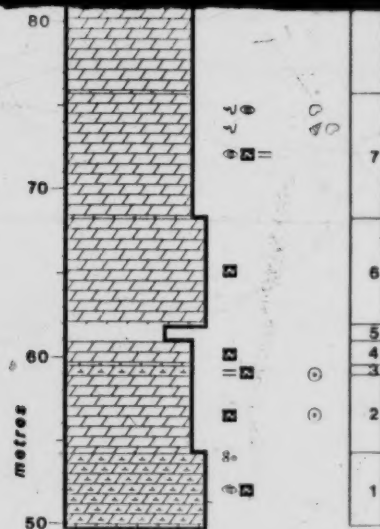
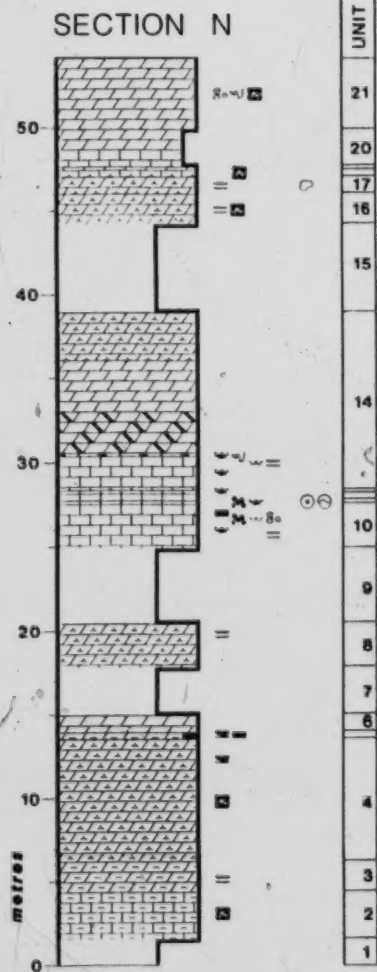
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4

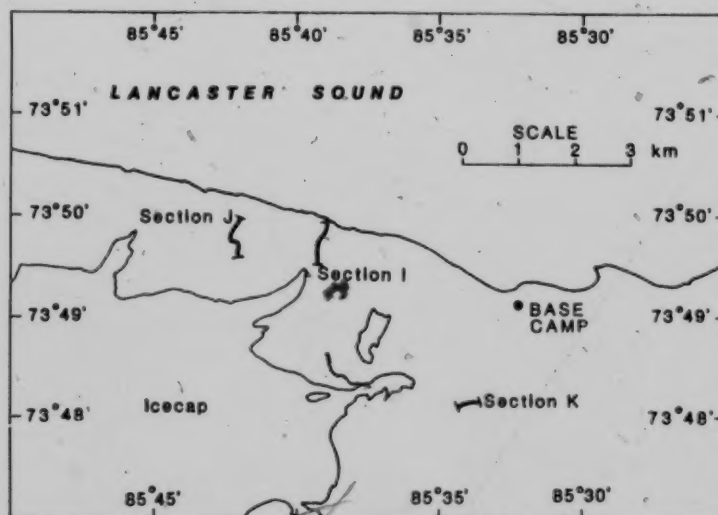
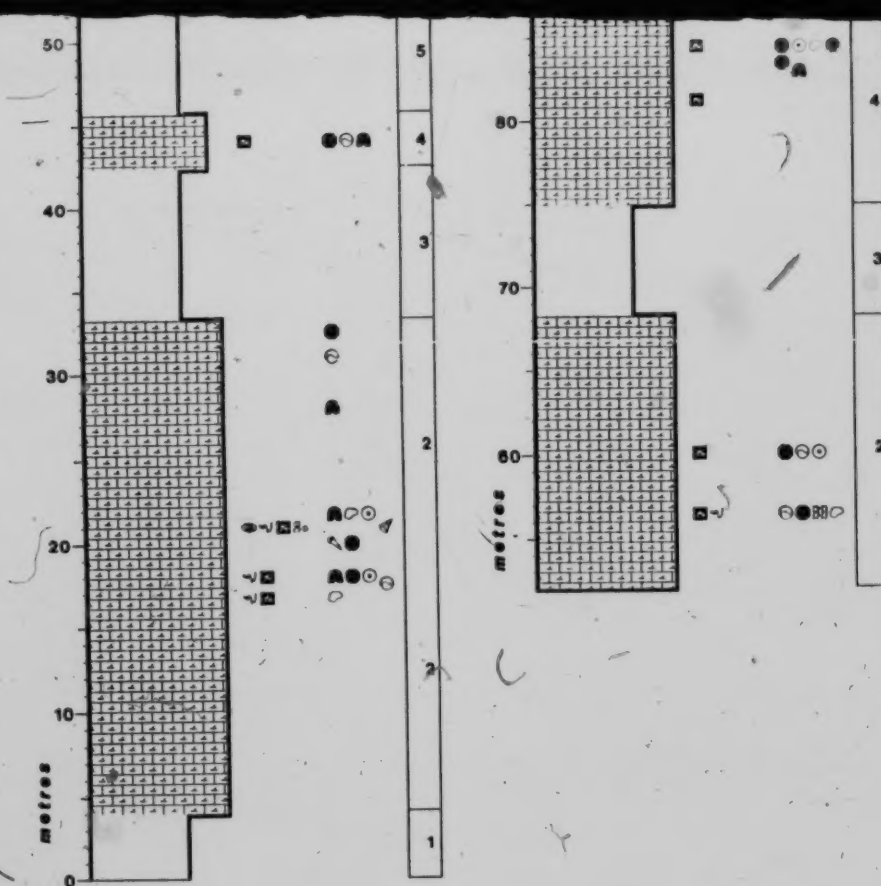
3

2



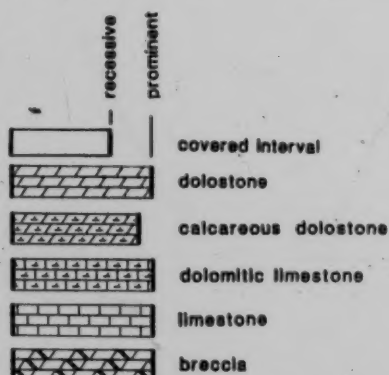


Baillarge Formation,
member a

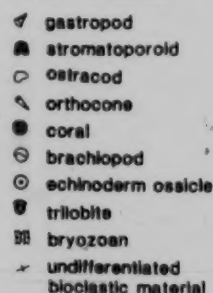


LEGEND

LITHOLOGY SYMBOLS

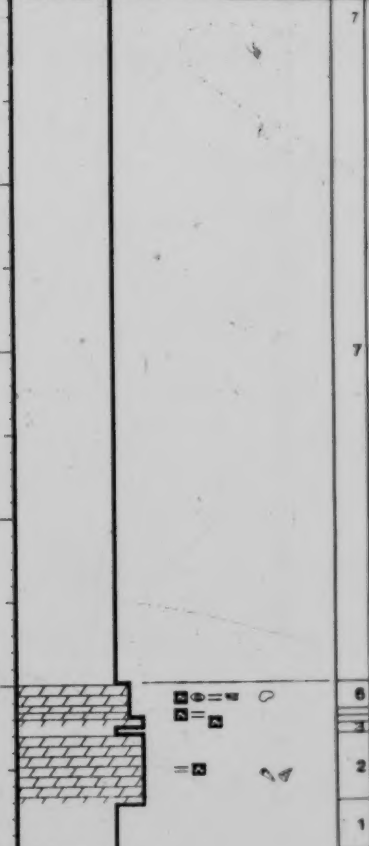
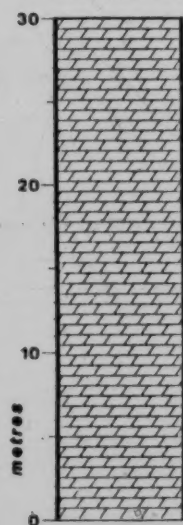


FOSSIL SYMBOLS

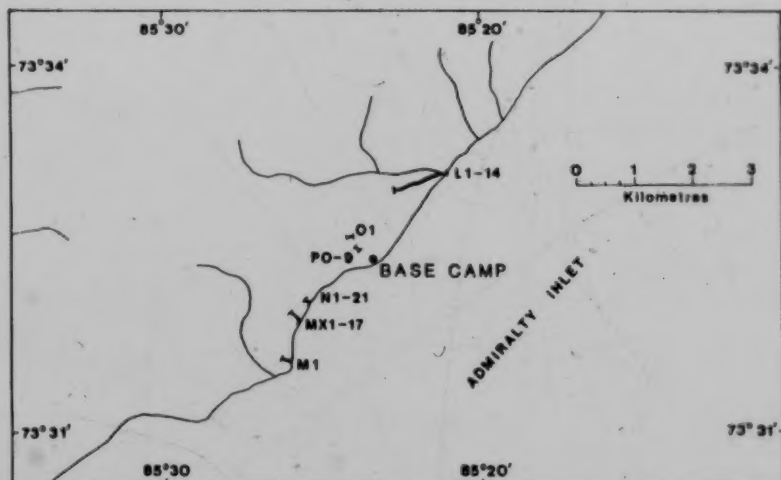


SEDIMENTARY STRUCTURE SYMBOLS

SECTION M



Ship Point Formation

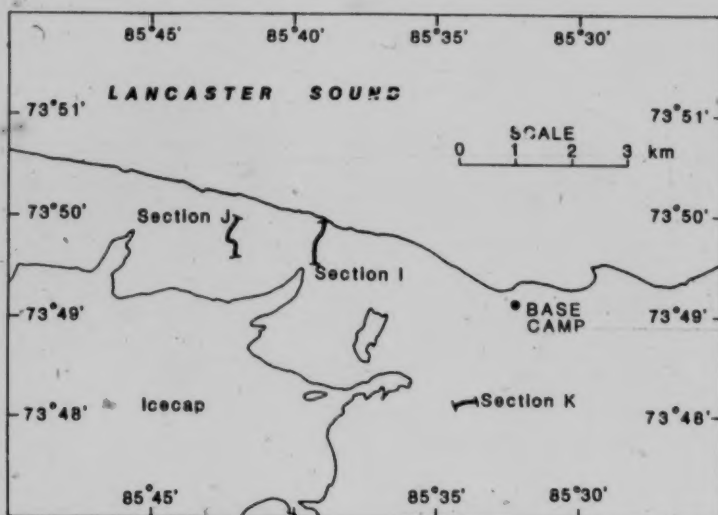
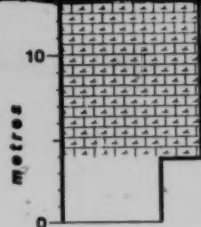


LEGEND

LITHOLOGY SYMBOLS

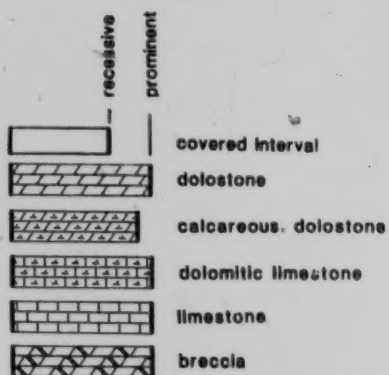
FOSSIL SYMBOLS

gastropod

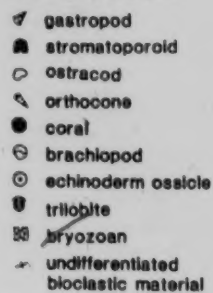


LEGEND

LITHOLOGY SYMBOLS



FOSSIL SYMBOLS



SEDIMENTARY STRUCTURE SYMBOLS

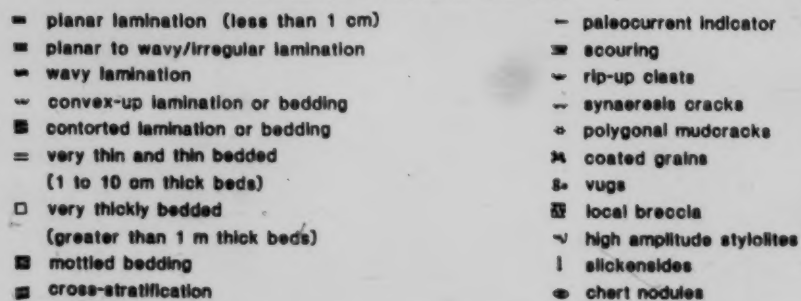
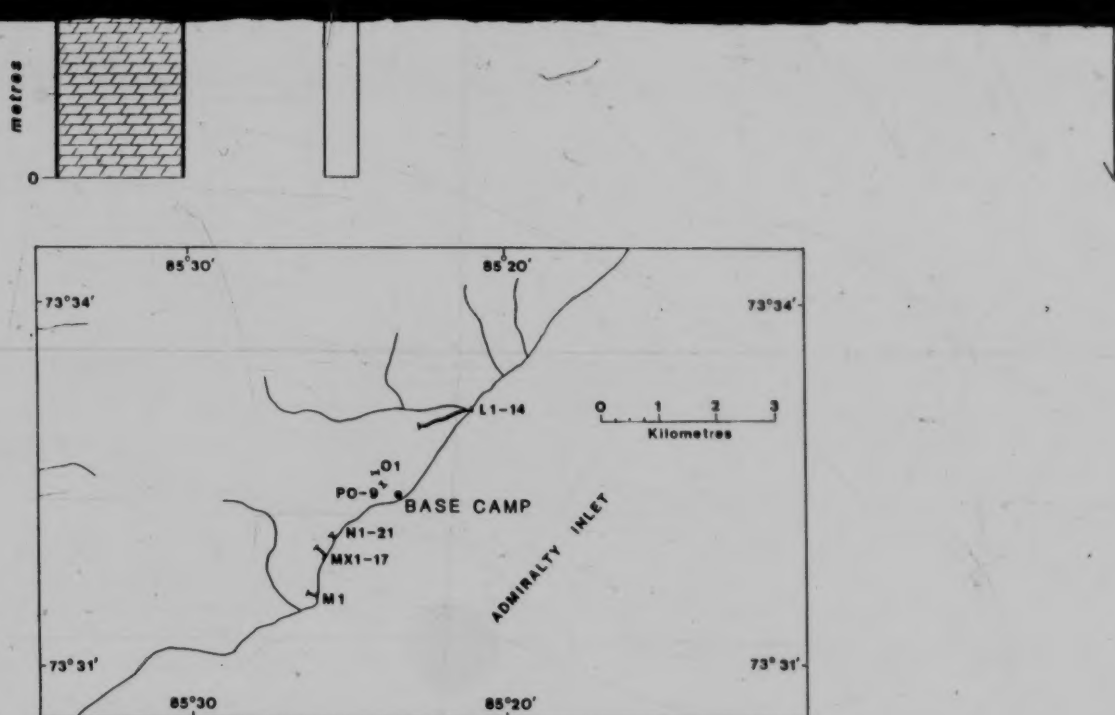


Figure G: Sections I, J. & K, Stanley Point



LEGEND

LITHOLOGY SYMBOLS

recessive	prominent
covered interval	
	dolostone
	calcareous dolostone
	dolomitic limestone
	limestone
	breccia
	argillaceous limestone
	argillaceous dolostone
	quartz sandstone

FOSSIL SYMBOLS

	gastropod
	stromatoporoid
	ostracod
	orthocone
	coral
	brachiopod
	echinoderm ossicle
	trilobite
	bryozoan
	undifferentiated blocky material

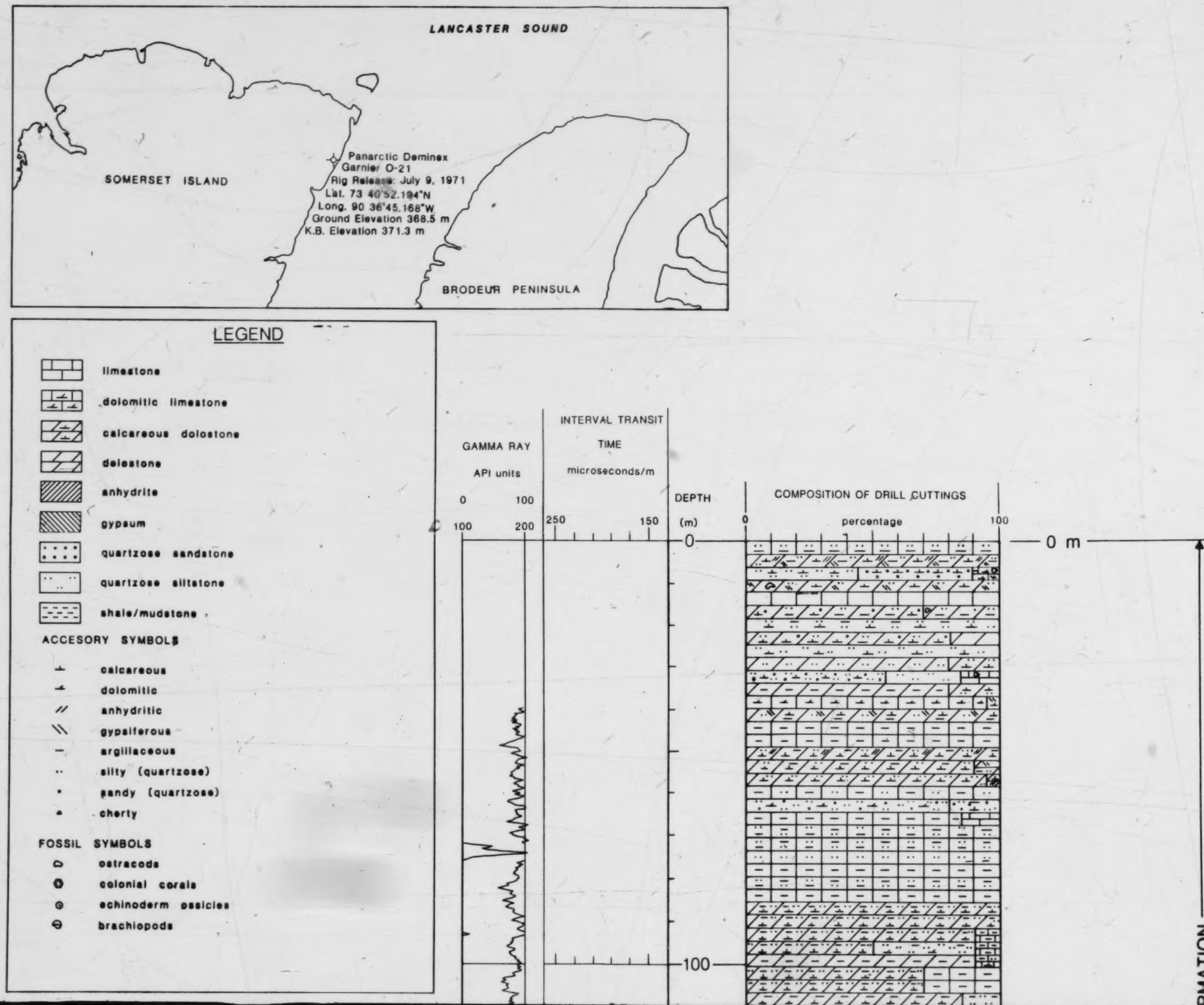
SEDIMENTARY STRUCTURE SYMBOLS

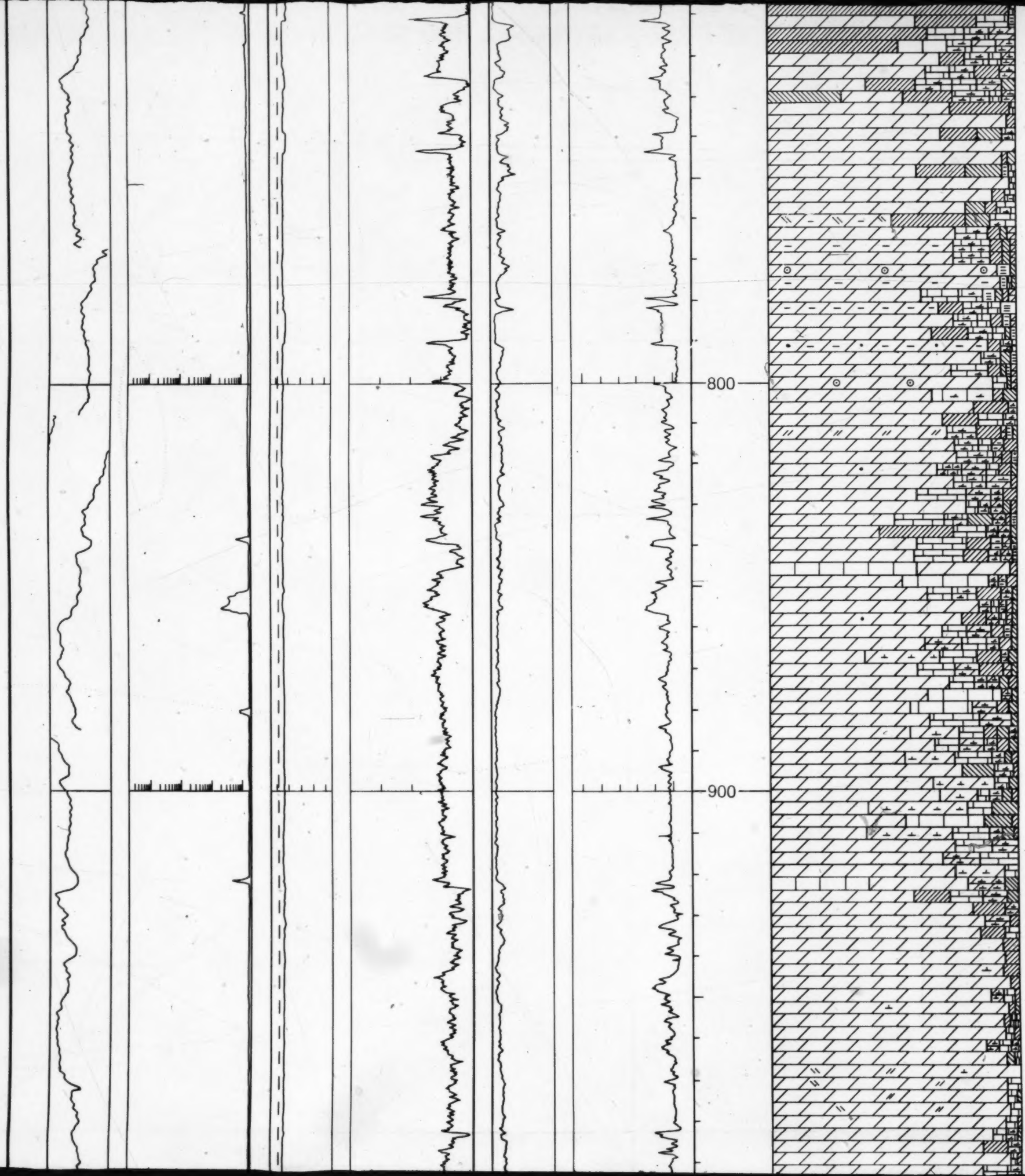
	planar lamination (less than 1 cm)
	planar to wavy/irregular lamination
	wavy lamination
	convex-up lamination or bedding
	contorted lamination or bedding
	very thin and thin bedded (1 to 10 cm thick beds)
	very thickly bedded (greater than 1 m thick beds)
	mottled bedding
	cross-stratification
	paleocurrent indicator
	scouring
	rip-up clasts
	synaeresis cracks
	polygonal mudcracks
	coated grains
	vugs
	local breccia
	high amplitude stylolites
	slickensides
	chert nodules

Figure H: Sections L,M,MX,N,O & P, SW of Cape Crauford

2 of/de 2

Fig. J: PANARCTIC DEMINEX GARNIER O-21
WELL LOGS AND COMPOSITION OF DRILL CUTTINGS





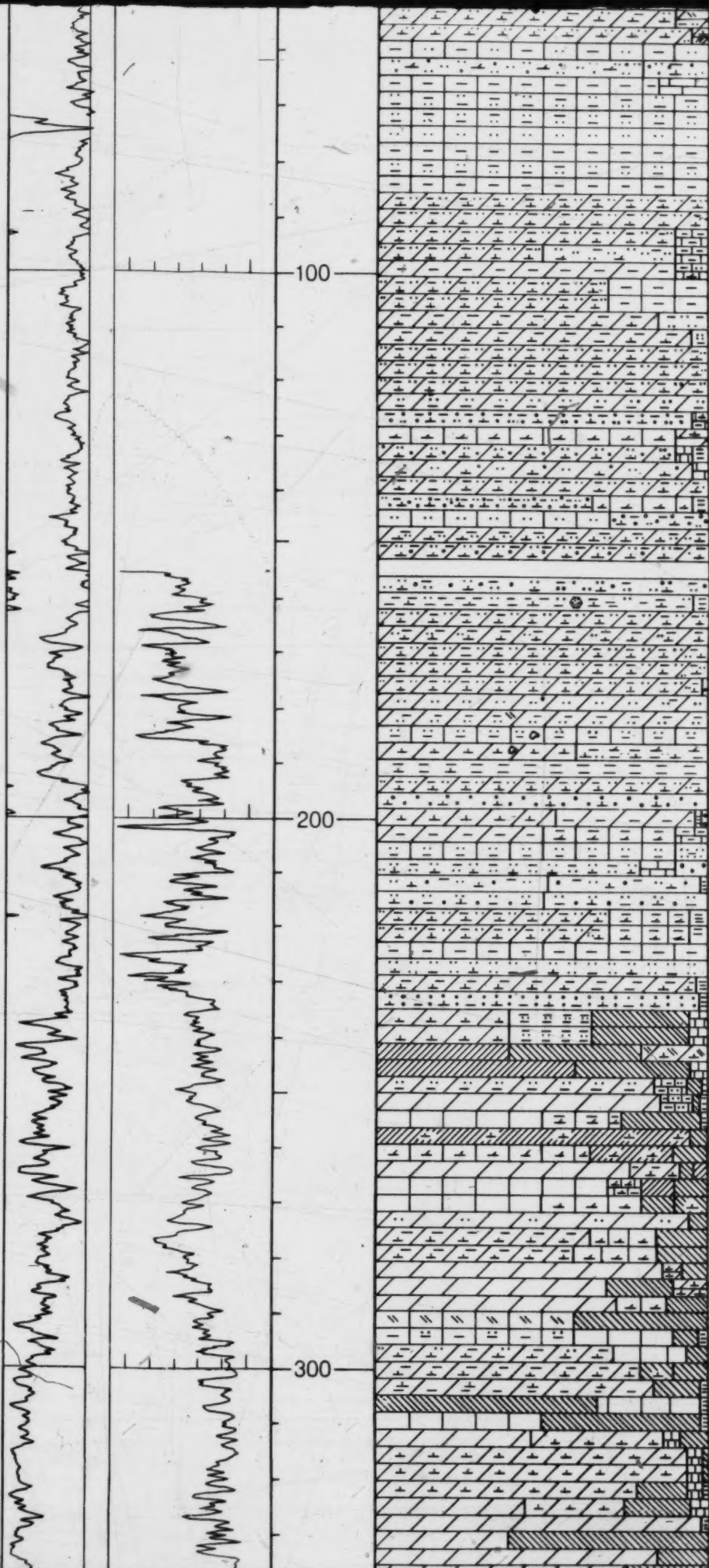
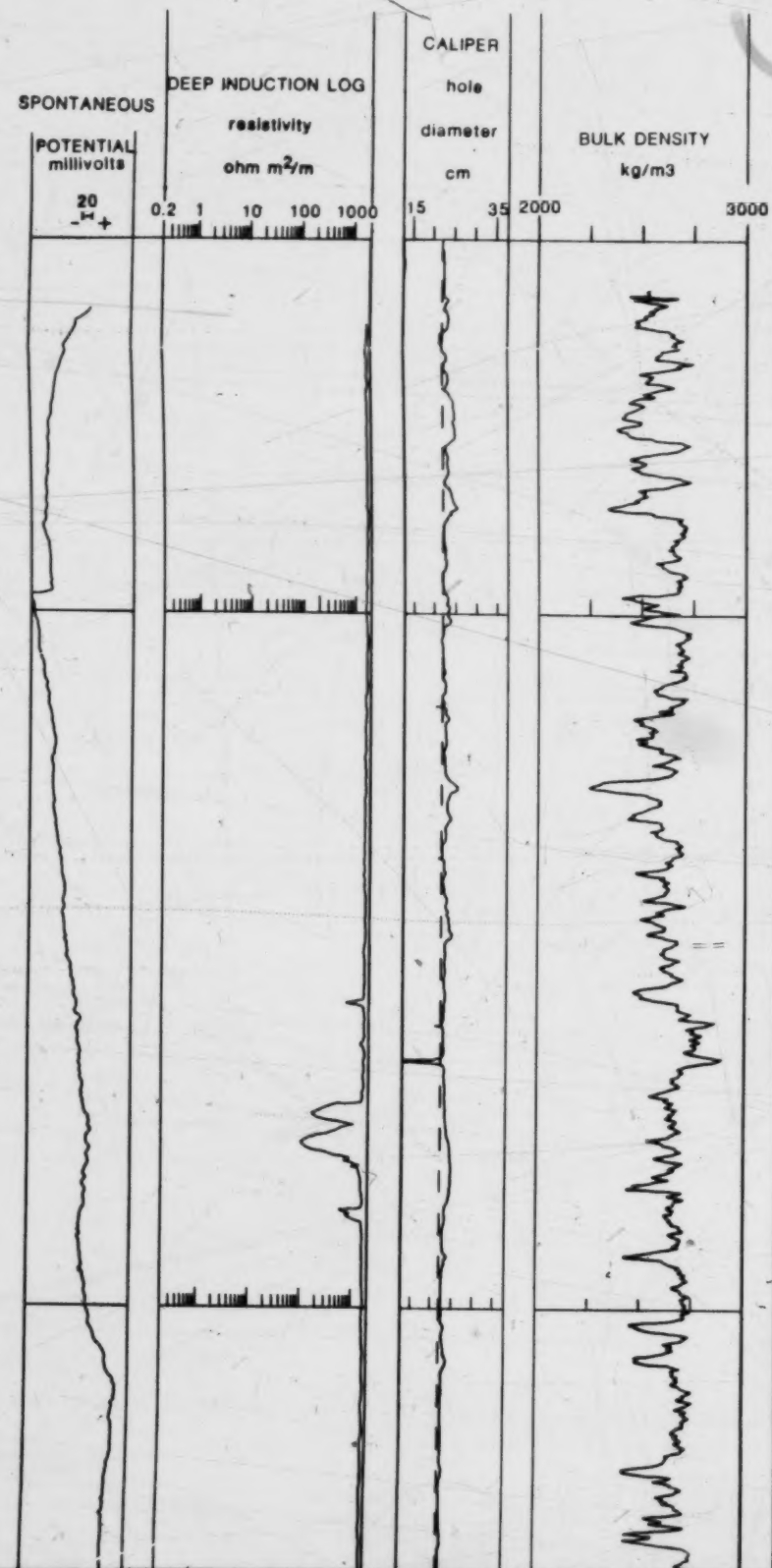
UNIT D

UNIT E

932 m (3058')

CARBONATE-EVAPORITE S

- silty (quartzose)
 - sandy (quartzose)
 - cherty
- FOSSIL SYMBOLS
- ostracods
 - ⊗ colonial corals
 - ⊙ echinoderm ossicles
 - ⊕ brachiopods

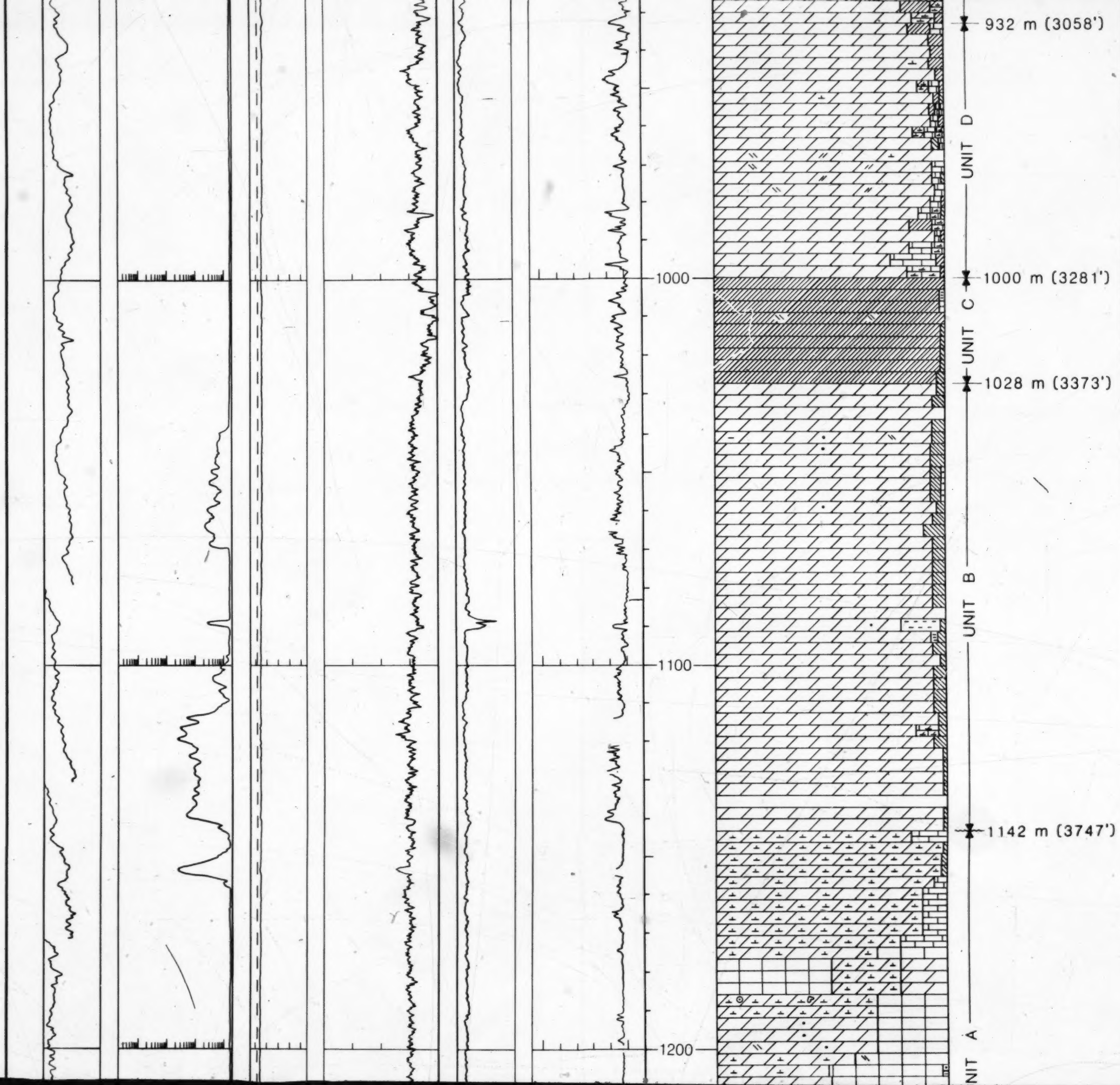


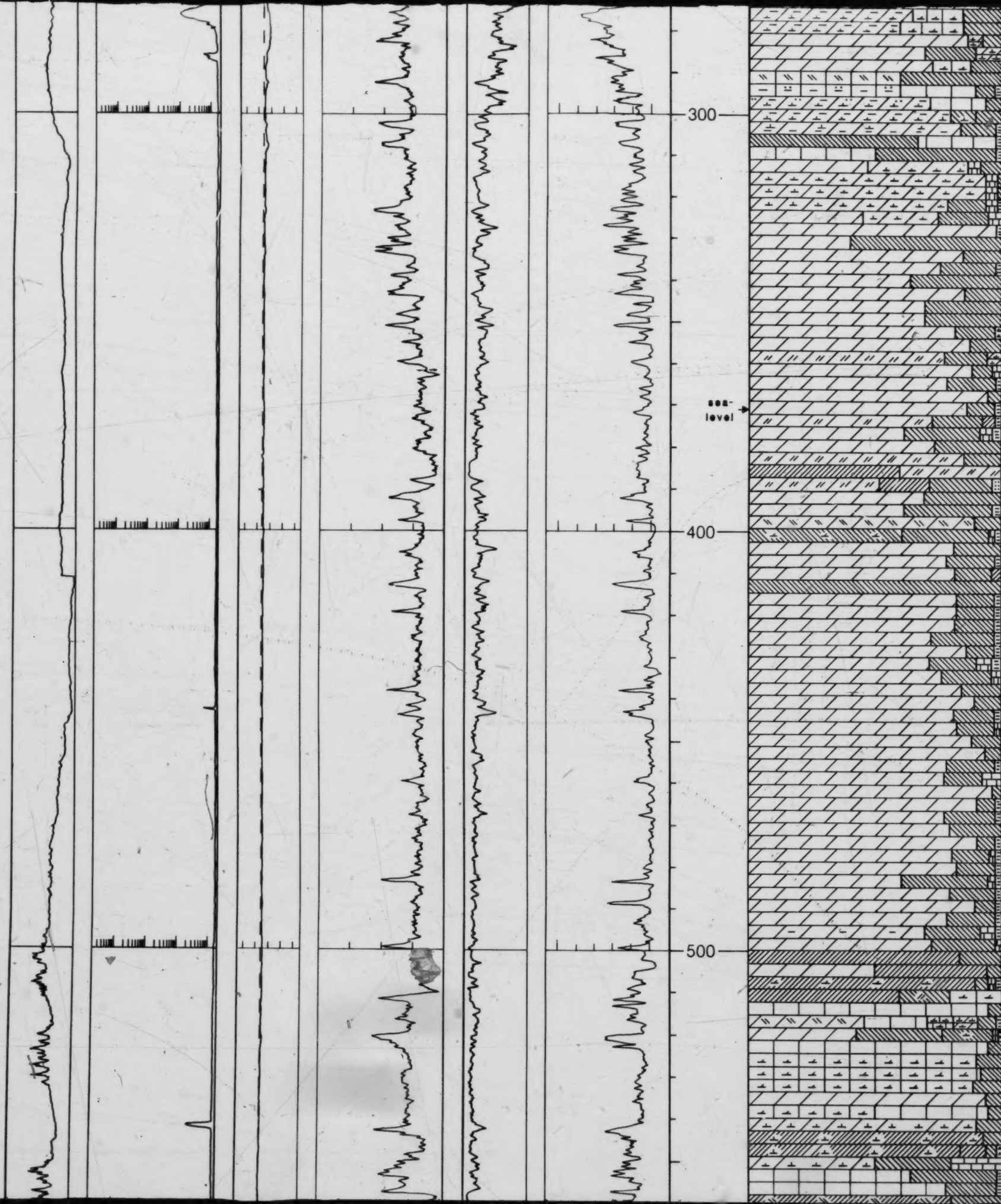
234 m (768')

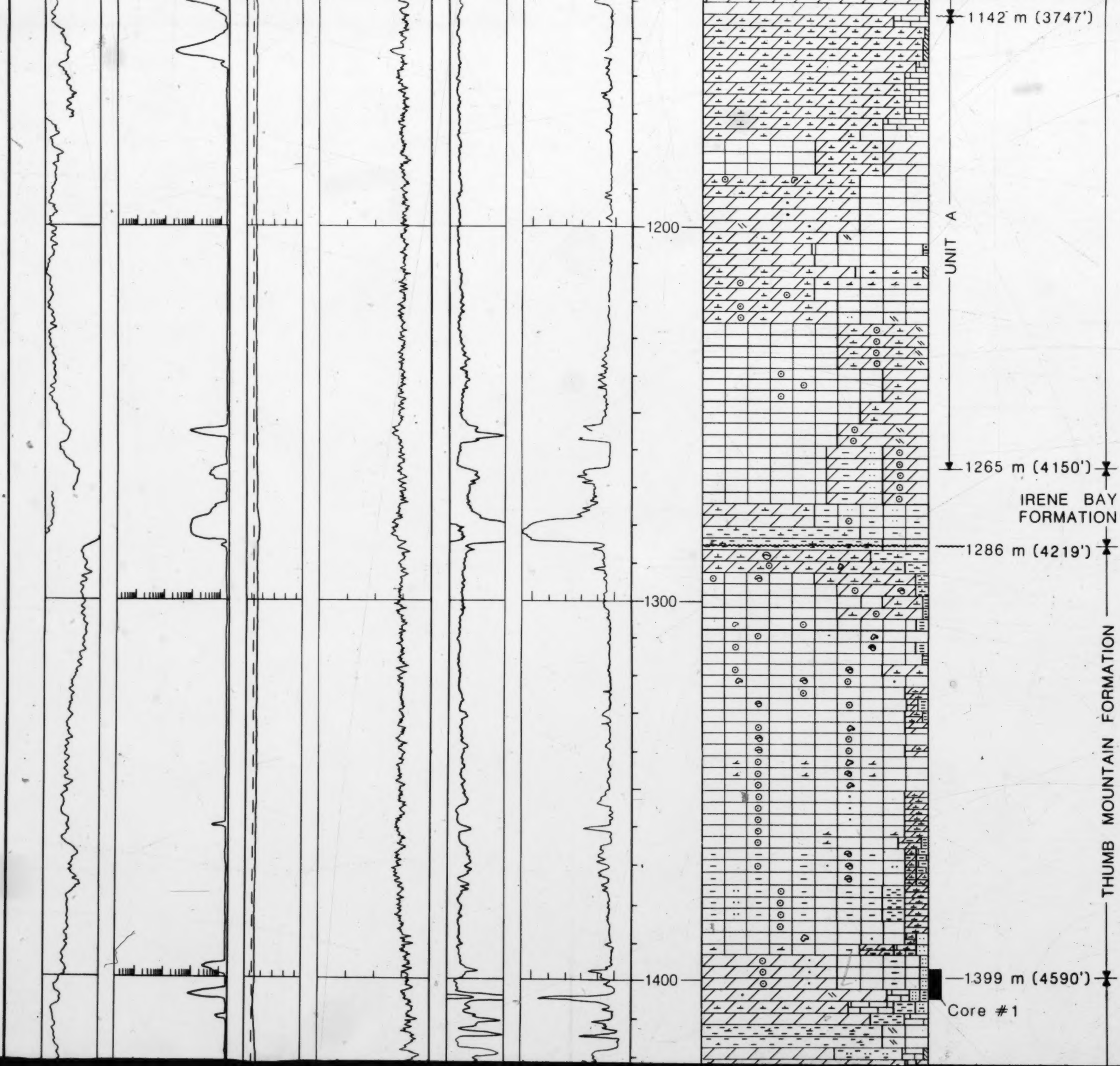
UNIT

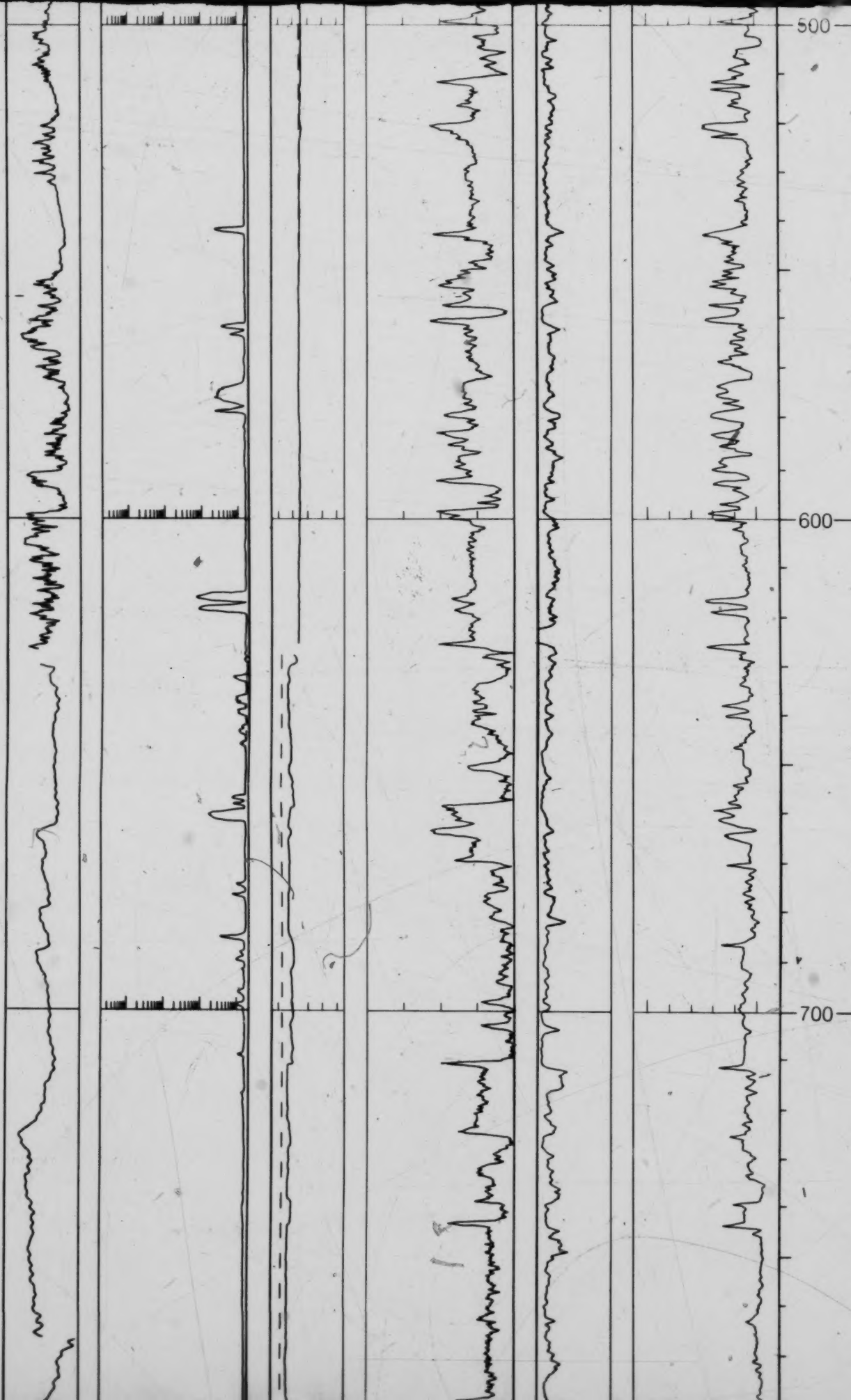
327 m (1073')

LEOPOLD FORMATION

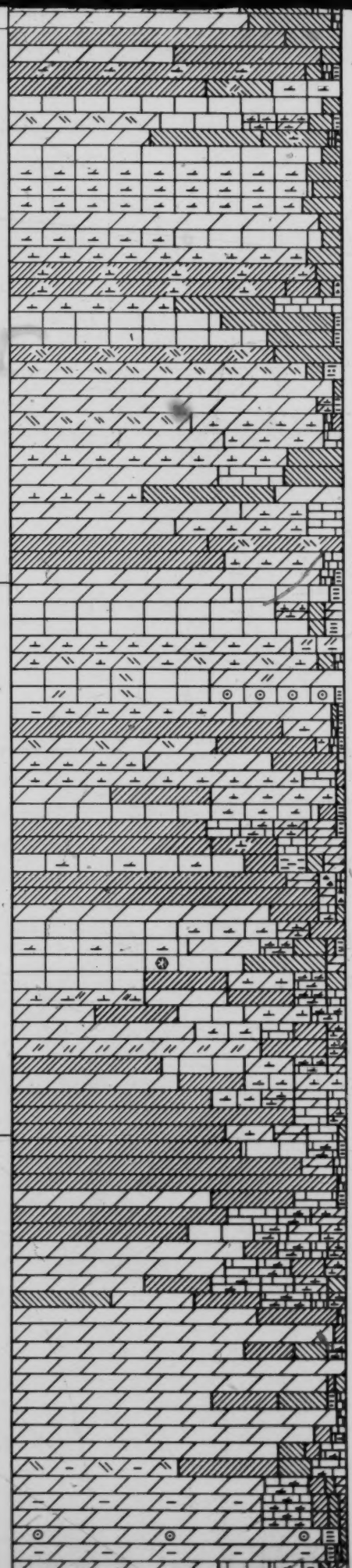






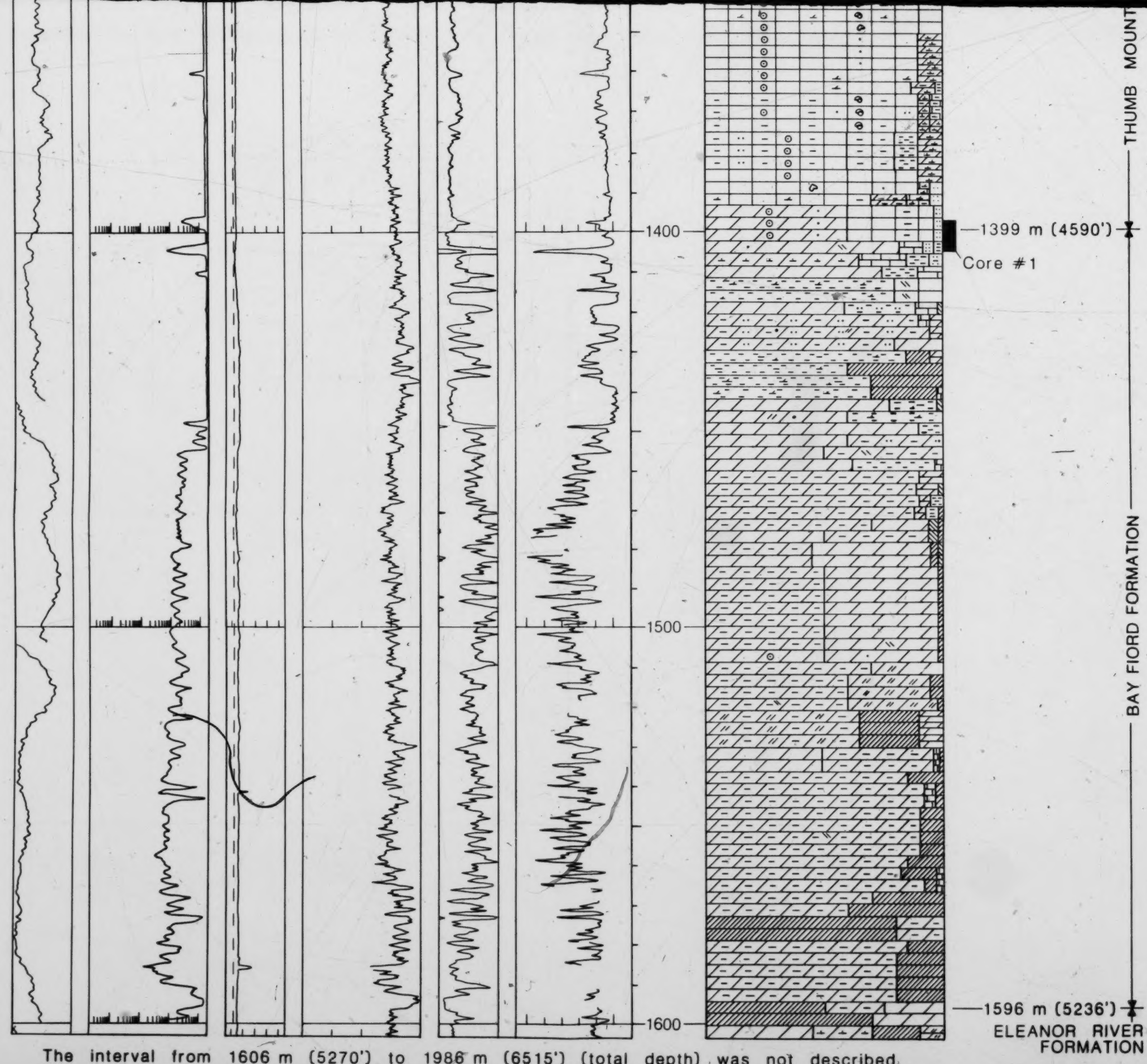


500
600
700



507 m (1663')
UNIT F
677 m (2221')

CARBONATE-EVAPORITE SEQUENCE



1 of/de 2